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Paper

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Synthetic studies towards *N*-substituted 3-vinyl-4-piperidineacetic acid derivatives

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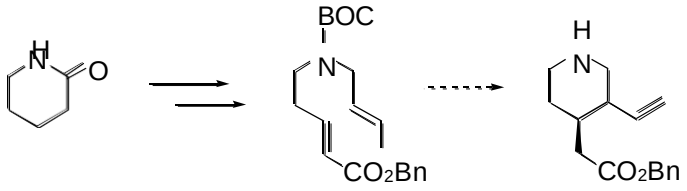
Abstract

The synthesis and full characterization of two new (*E*)-2-butenyl)-5-amino-2-pentenoates, (*Z*)-4-[*N*-(3-buten-1-yl)benzamido]-2-buten-1-ol, and (*Z*)-1-chloro-4-[*N*-(3-buten-l-yl)benzamido]-2-butene are reported. These were designed as substrates for a projected thermal ene cyclization leading to the *N*-substituted 3-vinyl-4-piperidineacetic acid scaffold. Although conditions for this ene-cyclization have not yet been uncovered, the ease of preparation of these ene-cyclization substrates gives promise for their future use.



Keywords: 2-Piperidone, 3-vinyl-4-piperidineacetic acid, 1,7-dienes, ene-cyclization

Synthesis of some dipyrrolo phenanthroline derivatives as novelmacromolecules

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Abstract
Some *N*-heterocyclic compounds such as pyrazino[2,3-*f*][1,10]phenanthroline and dipyrido[3,2-*a*: 2',3'-*c*]phenazine can react with dialkyl acetylenedicarboxylate to give new helical compounds, which exhibit nonplanarity enforced by the crowding of the pyrrole rings.

Keywords: Helical compounds, pyrazino[2,3-*f*][1,10]phenanthroline, dipyrido[3,2-*a*:2',3'-*c*]phenazine, dialkyl acetylenedicarboxylate and dipyrrolo phenanthroline

Introduction

Addition reactions of acetylenic esters to nitrogen-containing heterocycles have been described by several research groups[1-9] and often lead to various products which may require great experimental skills for successful resolution.

These polycyclic compounds are very interesting molecules not only from theoretical viewpoint (synthesis, reactivity, stereochemistry, etc.) but also for their biological activity. These azapolycyclic compounds show a variety of biological activities (antimicrobial, antineoplastic, antiviral, etc.)[10-13] and can be effective pharmacophore units of drugs which increase substantially the value of these compounds. For instance some pyrrolo[1,2-*f*]phenanthridines showed unique properties and be able not only to reduce the HIV-induced cytopathogenicity, but also to stimulate the growth of the same MT cells at lower concentrations.[14]

An example of these reactions is the reaction between pyridine and dimethyl acetylenedicarboxylate in methanol, in which the indolizine 1,2,3-tricarboxylate **1** is isolated.[15-20] 1,10-phenanthroline derivatives also can react with acetylenic esters to give dipyrrolo[1,2-*a*:2',1'-

Control efficiency of Salicylic acid activity Microcapsule against post harvest blue mould in Apple food.

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ABSTRACT

The ability of salicylic acid and jasmonic acid to suppress post-harvest infection with green mould *Penicillium digitatum* and blue mould *P. italicum* on three citrus species *Citrus reticulata* 'Kinnow', *C. limon* 'Meyer Lemon', and *C. limetta* 'Mosambi' was evaluated in a dose-response study. Salicylic acid (SA) and jasmonic acid (JA) were applied to the fruits as a post-harvest dip treatment followed by wound inoculation with the pathogens. Both resistance inducers caused a significantly lower disease severity compared with the infected but non-treated control, whereas disease incidence was not significantly lower than in the control. The efficacy of both SA and JA in reducing disease severity was concentration-dependent; the use of higher concentrations resulted in a greater degree of suppression. All the *Citrus* species tested in this study showed different responses in terms of disease development. *C. limon* 'Meyer Lemon' showed the highest disease development, and *C. limetta* 'Mosambi' the lowest. To get an insight into the mechanisms underlying the increase in resistance, the activity of defence-related enzymes – peroxidase (POD) and polyphenol oxidase (PPO) – was recorded in SA- and JA-treated fruit peelings. The activity of both enzymes was directly proportional to the concentration of the SA and JA applications. The highest activity of PPO and POD was observed in *C. reticulata* 'Kinnow' and the lowest in *C. limon* 'Meyer Lemon' fruits. This study is the first to document an increase in the activity of PPO and POD in SA- and JA-treated *Citrus* species in the presence of blue mould and green mould pathogens.

Key words: enzymes, *Penicillium digitatum*, *P. italicum*, post-harvest, resistance inducers

Abbreviations:

BM − blue mould, GM − green mould, JA − jasmonic acid, POD − peroxidase, PPO − polyphenol oxidase, RH – relative humidity, SA − salicylic acid

INTRODUCTION

Fresh fruit exports are very important for a country's economy and citrus fruits are an important part of all fresh fruit exports in the world (Ceylan et al., 2018). Fungal decay impairs fruit quality and causes major economic losses (Kahramanoğlu et al., 2018). Citrus fruits are susceptible to various post-harvest fungal diseases that cause significant economic losses during storage. Among them, green mould, caused by *Penicillium digitatum* Sacc., and blue mould, caused by *Penicillium italicum* Wehmer, are the most damaging post-harvest pathogens (Moscoso-Ramírez and Palou, 2013). *P. digitatum* can cause up to 90% of total post-harvest decay in

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NEW SYNTHETIC METHOD OF 4-METHOXY-7H-FURO [3, 2-g][1]BENZOPYRAN-7-ONE

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ABSTRACT

4-Methoxy-7H-Furo[3,2-g][1]benzopyran-7-One is one kind of linear Furanocoumarins, which shows a wide range ofbiologicalproperties.Asimplemethodforitssynthesiswasproposedinthispaper,whichwasaccomplishedfrom phloroglucinol and ethyl propiolate as original materials by etherification, iodination, Pechmann condensation, coupling reaction, hydrolysis and decarboxylation. Intermediates and the target compound were characterized by ^{1}H NMR, IR and MS. The proper reaction conditions were optimized by experiments and the feasibility of route was alsostudied.Allreactionswereprecededundernormalpressurewithmildconditionandrelativelysimple post-processing, which shows a new route for the preparation of furanocoumarins.

Keywordsfuranocoumarin,phloroglucinol,o-iodophenol,totalsynthesis.

INTRODUCTION

Furanocoumarins are natural products attracting a great deal of attention due to their potential biological properties[1-3].Manyofthemareeffectiveininhibitoryactivityagainstbacterium,virus,tumor,hyperplasia and HIV[4-8]. Furanocoumarins are also extensively used in photosensitive medicament, photosensitive pesticide and molecular biology[9].

4-Methoxy-7*H*-Furo[3,2-g][1]benzopyran-7-One,whichwasfirstisolatedfromaplantcalledBergamiain 1947 and total synthesized by Goupil[10] in 1984, is one kind of linear Furanocoumarins, and have attracted much attention in recent years due to a wide variety of biological features, including cytotoxic, antitumoral,andantimalarialactivities[11].Itisalsoanapplicableintermediateforthesynthesisofmore complex natural products[12,13]. For its content in Bergamia is very low[14] (< 2%), the synthesis of furanocoumarins has been paid considerable attention in the world. Several synthetic methods were reported[15-17].However, duetothe too-long technicsand lowchemoselectivity,many methodsonly lead to very lowyield[15-20].Meanwhile, rigorousconditionsofthe reactionand theuse of expensive catalyst make furanocoumarins'synthesisverydifficulttoindustrialization.Inthispaper,anewsynthesisrouteto

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Synthesis and Characterization of complex vanadyl schiff bases

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ABSTRACT

Neutral tetradentate N2O2 type complexes of vanadium(IV) have been synthesized using a Schiff base formed by the condensation of o-aminobenzoicacid, o-aminophenol. Benzidin and 1,4-phenylenediamine with Benzil, saliasldehyde, and 2-methlycyclo-pentane-1,3-dione in alcohol medium. All the complexes were characterized on the basis of their micro analytical data, elemental analysis, melting points, IR, UV–Vis spectra and magnetic moment properties. The infrared spectrum of the complexes under investigation confirmed the site of chelation, hence, the complexes showed strong absorptions due to ν(C=N) and ν(C—O). The above absorptions have been shifted on complexation confirming the chelation positions. The UV–Vis spectral data and the magnetic moment suggested that all the complexes are square pyramidal geometry. The vanadyl(IV) complexes showed the mononuclear and polynuclear metal structures. Due to the complexity of the vanadyl complexes under investigation further study are in progress.

Keywords: Benzidin, saliasldehyde, square pyramidal and vanadyl complexes.

INTRODUCTION

The complexes of transition metals have been used in solution as biomimetic catalysts for oxygen atom transfer, and as catalysts for enantioselective epoxidation, aziridinations, mediating organic redox reactions and other oxidative processes. Vanadium is a physiologically important trace element that is found in both anionic and cationic forms with oxidation states ranging from -1 to +5.[1-3] Vanadyl(IV) complexes are very interesting as model compounds for the clarification of several biochemical processes.[24] The physico-chemical properties of vanadyl(IV) complexes have been used to treat both insulin-dependent type-1 and non-insulin-dependent type-2, the vanadyl(IV) complexes proposed on the basis of the results of diabetic model animals by using a concept of equivalent transformation, which proven to be effective in changing the chemical property of a complex.[5] The Vanadyl and the micro-mineral derived from Vanadium, has been shown effective in helping to increase Insulin sensitivity.The main advantages of increased Insulin sensitivity are that it could promote less fat storage as well as that it may act as an Amino Acid magnet to cells. Several pharmaceutical agents have been used in diabetes treatment but many problems occurred such as side effect, hypoglycemia and weight gain, therefore new drug are needed, the vanadyl complexes have been proposed to function as potent insulin-mimetic and antidiabetic agents.[6]

EXPERIMENTAL

The materials and reagents used in this study were laboratory pure chemical. They include, Benzil, saliasldehyde, 2-methlycyclopentane-1, 3-dione, 1.4-phenylenediamine, Benzidin, o-aminobenzoicacid and o-amino phenol. The solvent used are ethanol, acetone, dimethylformamide (DMF), chloroform ($CHCl_3$), distilled water and diethyl ether (40 -60C°). The metal used is Ammonium-Meta-vanadate [NH_4VO_3].

Synthesis of the Schiff base ligand

An ethanolic solution (20ml) of amine was refluxed with ketone or aldehyade for about 12hrs. The reaction molar ratio was 1:2 or 1:1 (amine to ketone or aldehyade). The volume of the solution was reduced to one third, and then it was added with consonant stirring. The result which formed was filtered,

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Kinetics and Mechanism of Oxidation of N-acetyl-d-penicillamine in Acidified Iodate and Aqueous Iodine

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ABSTRACT

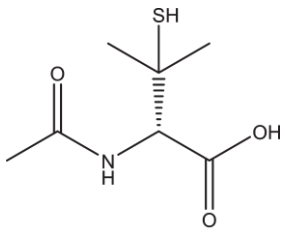
The oxidation of the biologically-active thiol, N-acetyl-d-penicillamine (NDPen) by acidified iodate and aqueous iodine has been studied. The stoichiometry of the reaction is 1:1 in which the thiol (RSH) is oxidized to its sulfonic acid (RSO_3H) without cleavage of the C-S bond. In excess acidified iodate the reaction displayed a short induction period, followed by formation of aqueous iodine. Overall stoichiometry in excess iodate was 6:5: $6\,IO_3^- + 5\,RSH + 6\,H^+ \rightarrow 5\,RSO_3H + 3\,I_2(aq) + 3\,H_2O$. The direct reaction of aqueous iodine and was relatively fast, over within 100 ms and had a stoichiometry of 1:3: $3\,I_2(aq) + RSH + 3\,H_2O \rightarrow RSO_3H + 6\,I^- + 6\,H^+$. The reaction is essentially diffusion-controlled and our stopped-flow with a mixing time limitation of 1.00 ms could only catch the reaction of the last iodine molecule. This reaction is, however, strongly inhibited by the product of reaction, I^-. This is due to the formation of the relatively inert triiodide anion: $I_2(aq) + I^- \rightarrow I_3^-$. Mass spectrometry results showed that the reaction proceeds through the sulfinic acid with negligible stabilization of the sulfenic acid. In excess of reductant, the dimeric species is the favoured product due to a rapid condensation-type reaction between the electrophilic unstable sulfenic acid and unreacted thiol.

KEYWORDS

Biological thiols, bioactivation, oxidations, oxyhalogen chemistry.

1. Introduction

N-acetyl-d-penicillamine (NDPen), an acetylated analog of d-penicillamine (DPen), is one of the chelating agents used clinically as an antidote to metal toxicity.[1,2] Heavy metals are ubiquitous in the environment and are associated with serious health effects which include neurological diseases such as Alzheimer's and Parkinson disease.[3–5] Chelation therapy is one of the methods in clinical use to reduce those toxic effects.[6,7] Some people receive exposure to mercury (Hg) from dental amalgam fillings, although the toxicological consequences of such exposure are still debatable.[8,9] NDPen has been recommended and used in the treatment of mercury poisoning as it was found to be more effective than D-penicillamine (DPen) and other agents in mercury extraction.[2,10] Chelating agents act by selectively binding toxic metals which are then excreted from the body[11]. However, some chelating agents are toxic and this limits their use and effectiveness[12]. For example, the toxicity of Dpen is characterized by alterations in dermal elastic tissue, hypersensitivity reactions such as urticarial and morbilliform, as well as lupus-like autoimmune reactions, which are not associated with NDPen.[13] Apart from chelation therapy, NDPen has also been used in the treatment of cystinuria, a condition in which there is excess cysteine resulting in painful cystine stones in the bladder and kidney.[14] NDPen also reacts with the free cysteine to form a mixed disulfide. This N-acetyl-d-penicillamine-cysteine disulfide is highly soluble in water; about 500 times that of cystine and 10 times that of D-penicillamine-cystine.[15] Thus, it makes NDPen more effective in extracting free cysteine. Reactions of NDPen and acidified nitrites to form the thionitrite (SNAP) have been extensively studied and reported in literarure.[16,17] S-nitrosothiols have found relevance in biology of vascular homeostasis, neurotransmission and inflammation.[18] S-nitroso-N-acetyl-penicillamine (SNAP) generates nitric oxide (NO) spontaneously, thus, it is an important NO donor and is involved in vasodilation of veins and arteries, along with inhibition of platelet aggregation.[19] There are other metabolic reactions that take place in the complex physiological environment which can also reduce bioavailability of therapeutic agents.[20] Thiols, for example that of DPen, are easily oxidized to a disulfide. Though minor, the extent to which such side-reactions take place may alter the therapeutic value of the chelating agents. Albeit in low concentrations, oxyhalogen species such as hypohalous acids; HOCl, HOBr and HOI, which are present in the physiological environment, have been observed to oxidize thiols. The kinetics and mechanism of oxidation of NDpen by acidified iodate and aqueous iodine is reported here.



N-acetyl-d-penicillamine

2. Experimental Procedures

2.1. Materials

The following reagent grade chemicals were used without further purification: sodium iodate, perchloric acid (70–72 %),

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Anti-corrosion Behaviour of Expired Tobramycin Drug on Carbon Steel in Acidic Medium

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ABSTRACT

The anti-corrosion behaviour of the expired Tobramycin (ETo) drug for carbon steel in 2 M HCl solution was investigated by thermometric methods (Thermo), potentiodynamic polarization (PDP), electrochemical impedance spectroscopy (EIS) and scanning electron microscopy (SEM). The results obtained from Thermo, PDP and EIS show that the level of anti-corrosion behaviour is in direct association to the ETo application. The model of adsorption isotherm fitted Langmuir, confirming a chemical adsorption system. The SEM image of carbon steel immersed in optimum concentration of ETo has confirmed the film formation on the carbon steel surface. The PDP technique, indicated by the Tafel plots, demonstrated that the ETo inhibitor acted as a mixed-type inhibitor. The results obtained from activation energy, E_a, the quantity of heat adsorbed, Q_{ads}, and standard free energy of adsorption, $\ddot{A}G°_{ads}$, show a chemical adsorption mechanism of the ETo inhibitor.

KEYWORDS

Tobramycin, thermometric, potentiodynamic polarization, electrochemical impedance spectroscopy, carbon steel, corrosion.

1. Introduction

Carbon steel plays vital roles in manufacturing companies, due to its low cost of production. However, various corrosive media can easily oxidize carbon steel, due to its high chemical reactivity. Corrosion of metals, which lead to massive loss of resources, is one of the major challenges in industries. Prevention of corrosion of metal is important to increase the life span of equipment that are made from iron, in order to protect the environment and save cost of maintenance.[1] Most operations in the manufacturing industries are associated with an acid solution, for instance, industrial acid cleaning, acid descaling, and oil well acidifying processes. Because of the strong corrosivity of acid solutions, anti-corrosive agents, called inhibitors are the best and cheapest method for protecting metals in aqueous media. The application of an inhibitor to the corrodent decreases the rate of dissolution of the metal. An organic compound containing electronegative heteroatoms, such as N, P, O and S[1], are mostly considered as organic corrosion inhibitors. Pharmaceutical drug molecules fall under this class of organic compounds. Current research in the field of corrosion inhibition is geared towards the use of these drugs as anti-corrosive agent.[2] Our group have made a series of contribution in this area of research, using Levofloxacin, Moxifloxacin and Nifedipine as corrosion inhibitors.[3–5] Karthikeyan *et al.*[6] investigated Vancomycin as a corrosion inhibitor for mild steel in a 1 M H_2SO_4 solution, using weight loss, potentiodynamic polarization (PDP) and electrochemical impedance spectroscopy (EIS). Abdullatef[7] studied the inhibitory action of Azithromycin as an inhibitor for corrosion of mild steel, copper and zinc in a 0.5 M H_2SO_4 solution using PDP and EIS. Karthikeyan *et al.*[8] also reported Dicloxacillin as an anti-corrosion additive for mild steel in a sulphuric acid solution using gravimetric and electrochemical methods. The drug, Farcolin, was reported as an organic inhibitor for acid corrosion of metals by Attia.[9] Farcolin was tested as a corrosion inhibitor using gravimetric and electrochemical methods. Ade *et al.*[10] studied the inhibitory performance of an anti-fungal drug as an organic inhibitor for mild steel in HCl, HNO_3 and H_2SO_4 using gravimetric method. However, most of the pharmaceutical drugs are much more expensive than the organic inhibitors which are currently used in industries. Thus, using fresh drugs as a corrosion inhibitor is not economically viable. Therefore, it was thought worthwhile to investigate the corrosion inhibition properties of expired drugs. It is well reported that a drug retains at least 90 % of its original potency even after its expiration date, but the use for medicinal purposes is restricted. Thus, the use of expired drugs as a corrosion inhibitor can solve two major problems: environmental pollution with pharmaceutically active compounds and the reduction of the disposal costs of expired drugs.[2,11–14] Dohare *et al.*[2] reported the application of expired Tramadol as an anti-corrosion agent for mild steel in hydrochloric acid. However, studies on expired drugs as anti-corrosion agents are scanty. Given the observation above, it was thought worthwhile to study the corrosion inhibition behaviour of expired Tobramycin (ETo) for carbon steel in acidic medium using thermometric and electrochemical methods. Tobramycin plays a very important role in the management of lung disease for both the adult and paediatric populations, because of its activity against *P. aeruginosa*. Tobramycin is also used in treating urinary tract infections due to its excellent inhibiting properties for urinary tract infection. The IUPAC name for Tobramycin is given as (2S,3R,4S,5S,6R)-4-amino-2-[(1S,2S,3R,4S,6R)-4,6-diamino-3-[(2R,2S,5S,6R)-3-amino-6-(aminomethyl)-5-hydroxyoxan-2-yl]oxy-2-hydroxylcyclohexyl]oxy-6-hydroxymethyl)-oxane-3,5-diol. It has a molecular mass of 467.575 g mol^{-1} with the molecular formula $C_{18}H_{37}N_5O_9$. The chemical structure of Tobramycin is given in Fig. 1.

2. Experimental

2.1. Acid Inhibitor Solution Preparation

The stock solution of the inhibitor, ETo, was prepared by dissolving the appropriate amount of the expired drug in a

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Design, synthesis and characterization of novel fluorinated styryl chromones

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(E)-3-(3-(Trifluoromethyl)-5-nitrophenyl)acrylic acid **1** when treated with substituted 2-hydroxyacetophenones **2** in dry pyridine and $POCl_3$ affords compound **3** which when reacted with pyridine/KOH by B. V. transformation gives **4**. Compound **4** on refluxing with acetic acid in HCl gives **5**. The structures of all synthesized compounds have been confirmed by spectroscopic techniques.

Keywords: Fluorine, diketone, styryl chromones

Substitution of hydrogen atom by fluorine into potentially active drug molecule alters lipophilic, electronic, steric parameters as well as pharmacokinetic and pharmacodynamic properties of drugs. Fluorine containing molecule is considered as an important tool in the design of new drugs[1]. Fluorine incorporated drugs are endowed with wide spectrum of biological activities such as insecticidal[2], anticoagulant[3], antimicrobial[4], antitumor[5] and anticancer[6].

β-Diketones are important intermediates in many drug syntheses[7]. The diketone derivatives are associated with broad spectrum of biological activities like corrosion inhibitor[8], antimicrobial[9], inhibition of amyloid α aggregation[10], antiinflammatory[11], *etc*.

Chromone moiety is a core fragment of different flavonoids like flavones, isoflavones and flavonols[12]. Large number of chromone derivatives are known for their pharmacological properties like such as anti-picornavirus capsid-binders[13], antitumor[14], anticancer[15]. Styryl chromones is one of the small family of chromone compounds exhibiting different biological activities like cytotoxicity[16], antiproliferative[17], monoamine oxidase inhibitors[18] and anti-noroviral agents[19].

Based on this valuable literature observations associated with fluorine, diketone and chromones the present work describes an attempt towards synthesis of fluorine containing different diketones and chromones (Scheme I).

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Transformations of perfluorotoluene by the action of 2-mercaptoethanol

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Dedicated to the memory of academician D.G. Knorre

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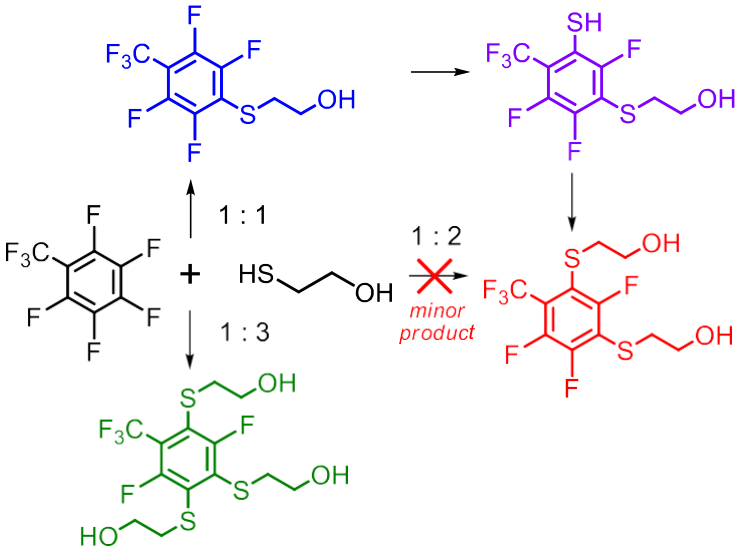
Abstract

The reaction of perfluorotoluene and 2-mercaptoethanol in the presence of K_2CO_3 in DMF has been studied and experimental procedures for selective introduction of one, two and three ethanolthiyl groups into perfluorotoluene have been elaborated.



Keywords: Perfluorotoluene, 2-mercaptoethanol, aromatic nucleophilic substitution, regioselectivity

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Material
Research

Nanophase Glass-Ceramics

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Future applications for glass-ceramics are likely to capitalize on designed-in, highly specialized properties for the transmission, display, and storage of information. Glass-ceramics with microstructures comprised of uniformly dispersed crystals <100 nm in size offer promise for many potential new applications as well as provide unique attributes for many current products. This paper focuses on two types of nanocrystalline glass-ceramics: transparent glass-ceramics and tough, high-modulus glass-ceramics with precisely engineered surfaces. Transparent glass-ceramics are formed from certain aluminosilicate glasses capable of efficient crystal nucleation and slow growth. The key crystalline phases include β-quartz solid solutions, characterized by low-thermal-expansion behavior; spinel, with high hardness and elastic modulus; and mullite, which shows unique chromium-luminescence behavior.

I. Introduction

GLASS-CERAMIC technology is based on the controlled nucleation and crystallization of glass. Although glass-ceramic articles can be fabricated through the internal nucleation of glass monoliths or via the sintering and crystallization of glass frits, internal nucleation affords a much wider array of potential microstructures. Some glass compositions are self-nucleating, but, more commonly, certain components known as nucleating agents are added to the batch to promote phase separation and internal nucleation. The nucleating agents melt homogeneously into the glass but promote very-fine-scale phase separation on reheating. The dispersed phase is typically structurally incompatible with the host glass and, therefore, precipitates tiny crystalline nuclei on heating at temperatures of 30°–100°C above the annealing point of the glass. These crystals serve as the sites for subsequent nucleation of the primary crystalline phases. In other cases, crystallization proceeds within or from the surfaces of the phase-separated globules themselves.

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*

Nucleation is followed by one or more higher-temperature treatments to promote crystallization of the primary phase or phases and development of the desired microstructure. The growth process continues until neighboring crystals impinge, creating a highly crystalline body with a small amount of residual glass, or until the residual glass is depleted in the crystal-forming components. Certain glass-ceramics are specifically designed to possess a microstructure of uniformly dispersed, nonimpinging crystals in a matrix of continuous residual glass.

Glass-ceramics have several advantages over conventional powder-processed ceramics. In addition to the ease of flexibility of forming in the glassy state, glass-ceramics possess a uniformity of microstructure and subsequent reproducibility of properties that result from the homogeneity of the starting glass. Furthermore, glass-ceramics provide a wide range of physical properties—such as coefficients of thermal expansion (CTEs) from -75×10^{-7}/°C to $+200 \times 10^{-7}$/°C—that often are not readily obtained in glasses or ceramics. Many commercial glass-ceramics are valued primarily for their near-zero thermal expansion, while the combination of high mechanical strength and zero porosity has been exploited by applications ranging from architectural materials to tableware to bone implants. Of the many types of microstructures obtainable in glass-ceramics, those based on uniformly dispersed crystals <100 nm in size provide unique attributes for current products and offer promise for many potential new applications. Such microstructures can be termed ‘‘nanocrystalline.’’

This paper focuses on two types of nanocrystalline glass-ceramics: transparent glass-ceramics and tough, high-modulus glass-ceramics with precisely engineered surfaces. The first group has numerous consumer and technical applications, while the second are of interest as magnetic memory disk substrates or other applications that require smooth surfaces, chemical durability, and high use temperature.

II. Transparent Glass-Ceramics

Transparent glass-ceramics generally have two distinctive properties: they are nanocrystalline, and they have greater thermal stability than their parent glasses, frequently possessing upper use temperatures of >800°C. The most important com-

centennialfeature

Journal of Material Research

Glass-ceramics derived from blast furnace slag can be prepared and characterized through a ceramic sintering process.

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Abstract

Glass–ceramics were synthesized using ground blast-furnace slag and potash feldspar additives by a conventional ceramic-sintering route. The results show 5 wt% potash feldspar can enhance the sintering properties of blast-furnace slag glass and the results glass–ceramics have desirable mechanical properties. The main crystalline phase of the obtained glass–ceramic is gehlenite ($2CaO{\cdot}Al_2O_3{\cdot}SiO_2$). A high microhardness of 5.2 GPa and a bending strength higher than 85 MPa as well as a water absorption lower than 0.14% were obtained.

Keywords: Blast-furnace slag; Sintering process; Glass–ceramics; Crystallization

1. Introduction

Glass–ceramics are fine-grained polycrystalline materials formed when glasses of suitable compositions are heat-treated and thus undergo controlled crystallization to reach a lower energy crystalline state [1]. Since the early 1960s, using waste to prepare glass–ceramics has been developed in Russia, by employing slag of ferrous and non-ferrous metallurgy, ashes and wastes from mining and chemical industries [2]. Lately, the waste of coal combustion ash, fly ash and filter dusts from waste incinerators, mud from metal hydrometallurgy, pass cement dust, different types of sludge and glass cullet or mixtures of them have been considered for the production of glass–ceramics [3–7]. Using waste to prepare glass–ceramics is significant for industrial applications as well as for environment protection [8].

The conventional approaches to sinter glass–ceramics usually include two steps: first vitrifying raw materials at a high temperature (1300–1500 8C) and then following a nucleation and crystal growth step. The disadvantage of the conventional route is that it is difficult to vitrify the raw materials and the high energy consumption in this step. An alternative manufacturing method to produce sintered glass–ceramics, in which sintering and crystallization of fine glass powders take place simultaneously, has recently been reported [9]. In such route fine glass powders are pressed and sintered, and the crystallization occurs with densification. However, this route also needs a short time to vitrify raw materials at high temperature for preliminary glass-making.

The blast-furnace slag is formed in the processes of pig iron manufacture from iron ore, contains combustion residue of coke, fluxes of limestone or serpentine, and other materials. If the molten slag was cooled quickly by high-pressure water, fine grain glass of vitreous Ca–Al–Mg silicate can be formed [10]. This suggests the blast-furnace slag can be used as a glass source to make sintered glass–ceramics and vitrifying raw materials at high-temperature step can be omitted. The free glass surfaces are preferable sites for devitrification and thus crystallization may occur without any nucleating agent. Therefore, the finely ground slag powder can used as the main component of parent glass. Comparing with the two sintered methods mentioned above, a remarkable advantage of the present study is absent of vitrification step because of the using of blast-furnace slag. Thus a low energy cost and manufacture simplicity can be expected. However, in our previous studies glass–ceramics prepared with pure blast-furnace slag show poor properties [11]. Therefore, some sintering additives are needed. In this study, we show when using blast-furnace slag to prepare glass–ceramics by a conventional ceramics route, if suitable amount of potash

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Experiments and finite element simulations are being conducted to investigate grip clamps for expanded diameter half-hard aluminum conductors with a composite core.

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***Abstract*—The cross-sectional area and outer diameter of the wire that have been put into use in the project are similar to those of the newly designed JLZX1K/F2A-530(630)/55 sparse-twisted carbon fiber expanded wire. The finite element analysis and the compatibility test of the stranded carbon fiber expanded diameter wire were carried out, and the combination of test and simulation was used to judge the radial pressure resistance of the composite mandrel and the force of the aluminum strand of the profile. It is concluded that the newly designed JLZX1K/F2A-530(630)/55 sparse-twisted carbon fiber expanded conductor can be used with the SKLT-60 grip clamps; the aluminum strand stress concentrates from the inner layer to the outer when the wire clamp clamps the wire.**

***Index Terms*—Grip clamps, expanded diameter half -hard aluminum conductors composite core reinforced, force transfer finite element, test.**

I. Introduction

Carbon fiber composite conductor has been widely used in transmission line engineering due to its advantages of high strength, large capacity, high temperature resistance, light weight, low linear expansion coefficient, low sag, non-magnetic, high temperature resistance and corrosion resistance [1], [2]. With the promotion of the theme of energy conservation and environmental protection, a new type of sparsely twisted carbon fiber diameter enlargement (reducing the material cost but ensuring the cross-sectional area of the conductor) conductor JLZX1K/F2A-530(630)/55 (below "530k630 carbon fiber diameter enlargement conductor") was born [3]. During the construction of all kinds of temporary anchor and tight wire for erecting wires, the force transmission between the wire and the anchor force system should be completed through the clamping of the clamping device.

Compatibility finite element analysis is carried out on 530k630 expanded diameter half-hard aluminum conductors composite core reinforced with grip clamps of three conductors with equal outer diameter that has been put into use in the project in this paper, and according to the results are related with test and analysis, finally got 530k630 expanded diameter half-hard aluminum conductors composite core reinforced can be used with SKLT-60 type grip clamps.

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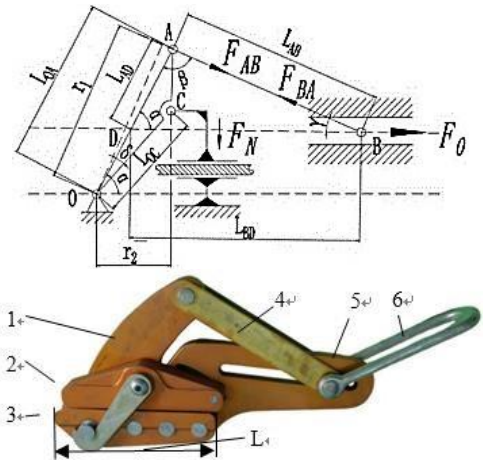
II. Analysis of Force Principle of Card Wire Device

The parallel movable grip clamps is A four-link structure, as shown in Fig. 1. The pull plate and the press-plate are hinged at point A, and the press-plate and the upper press-plate are hinged at point C.The distance between hinge point A and the far end point B of the slideway is the length of the drawplate LAB, and the distance between hinge point A and O is the length of the clamping plate LOA.The pull ring of the cable clamping device can beopened by parallel movement to the left. The wire is put in from the side, and the upper and lower clamping nozzles hold the wire after tightening the pull ring.TAB under transverse tensile F_0, the tension through four bar linkage pass and translated into positive pressure toward a wire clip mouth F_N, pulling through the TAB to the grip clamps of the fuselage.



1—Pressing plate; 2— Clip on the mouth;
3—Under the mouth; 4—Pull a board;
5— Ontology; 6—Pull tab

Fig. 1. Clamping force and structure diagram of clamping device.

The main force type of connecting rod is axial tension or pressure.When the clamping device clamps the wire, it shall ensure that the wire is stable and not loose when it is clamped [5]:

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Examining the Mechanical and Physical Properties of Natural Hybrid Composites

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***Abstract*—Brake lining is one of the components in the braking system that directly rub against the rotating drum or disk. The ability of brake lining can be seen from several things including being able to absorb the amount of kinetic energy when braking, having good hardness, low water absorption. Previously, brake lining was made of asbestos material which has resistance to high temperatures reaching 800˚C, but asbestos material has a negative impact on the environment and human health. This research was developed to overcome these problems, namely finding alternative brake lining materialsthat have good impact strength, good hardness and do notinterfere with the health of the driver of the vehicle and are environmentally friendly. This paper describes the mechanical and physical properties of the developed brake lining material. This brake lining material is made from basalt powder, shellfish powder, alumina powder and phenolic resin polymer as a binder with five variations of weight fraction. This material wasmade through a sintering process at a temperature of 150°C with a pressure of 2000 kg for 30 minutes, then each specimen was tested for impact strength using a Charpy impact testaccording to ASTM D 6110 standard, hardness was tested usingVickers test according to ASTM E384-99, and water absorption based on ASTM D 570-98 standards. The average impact strength of brake lining specimens was obtained at 0.0003327 J/mm², better than the average impact strength of brake liningsfrom asbestos material. While the hardness obtained was the lowest 24.72 VHN and the highest was 26.55 VHN, still better than the asbestos brake lining of 24.75 VHN, and the highest water absorption of the brake lining specimens obtained was 0.041558 still lower than the water absorption of asbestos brakelining.**

***Index Terms*—Natural hybrid composite, hardness, impact strength, water absorption.**

I. Introduction

One component of the braking system is the brake lining, which this component serves to reduce speed or stop the vehicle. This component rubs directly against the rotating drum or disk [1]. In general, brake pads are asbestos, which have a high temperature resistance of 800°C [2], and they also have low water absorption [3]. However, asbestos brake linings have been discontinued because they have a negative impact on the environment and human health [4], [5].

Then other researchers also developed clamshell brake pads with a grit size of 600 μm which were tested at speeds below 100 km/h [6]. Morphological testing of shellfish granules is very possible to use as a friction plate for asbestos substitutes [7], and thermal test of shellfish material for friction material has also been carried out and has good properties [8]. However, the results achieved at this time have not been able to maintain mechanical properties, especially for wear resistance, temperature resistance, and high water absorption.

This paper discusses brake linings made from hybrid composites by mixing basalt powder, shellfish powder, alumina powder and phenolic polymer resin (PR-51510i) as a binder. Basalt is a rock from a volcanic eruption crushed into powder of a specific size. This material has heat resistance up to 1500˚C [9], has excellent corrosion resistance properties, low water absorption and is non-toxic [10]. Besides this material has excellent physical and mechanical properties, good ductility, high wear resistance [11], and this fiber can replace glass fibers [12]. Besides that, the main characteristic of this material is that it has low thermal conductivity.

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II. Material and Method

A. Materials

This research was carried out by hybridizing three materials as reinforcement and one material as binding matrix in specific compositions. The reinforcing material consists of basalt powder, shellfish powder and alumina powder which are all in the form of solid particles with a sizeof 0.0074 millimeters, then as a matrix material is a phenolic resin (PR-51510i). Basalt characteristics are shown in Table I.Shellfish powder used consisted of several elements, namely 0.03% Fe_2O_3, 1.25% Al_2O_3, 7.88% SiO_2, 22.28% MgO, and 66.70% CaO.

TABLE I: Properties of Basalt Material

Properties of basalt	Value (unity)
Tensile strength	500k-550k (psi)
Density	2600-2630 (kg/m^3)
Operation temperature	-265 - 700 (ºC)
Sintering temperature	1050 (ºC)
Modulus of elastisitas	9100 - 1100 (kg/mm^3)
Elongation at break	3.15 (%)
Heat resistance	700-1000 (ºC)
Melting point	1170 (ºC)
Mohs Hardness @20ºC	5-9

B. Method

This brake lining material is made by mixing, compacting, and sintering at a temperature of 150°C. The sintering process of this brake lining material specimen was carried outwith emphasis for approximately 30 minutes and a compressive load of 2000 N. The size and shape of the test specimen were made according to ASTM D 3171-09 standard, as shown in Fig. 1 and Fig. 2.

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Oil films' thickness is influenced by their contact area

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***Abstract*—With the development of the tool machine industry, the precision and quality demand for processing is more exquis-ite, from the traditional industrial manufacturing equipment in the past, to the current development of high-speed, high-pre-cision, high-efficiency intelligent automation tool machine equi-pment, in the face of today's globalization,customerization andenvironmental awareness trend.**

Taking the vertical milling machine as an example, the feed system drives the machining in the direction of the tool machining to complete the cutting process.The rail c-ontact surfac-e of the feed system is grinding. It produces noise, bad vibration, processing rigidity is reduced, processing accuracy is reduced, friction almost thermal energy is generated, etc. Finally it reduces the service life of the servo motor. In this study, the contact between the slide rail and the slide seat was obtained by using the homemade device to obtain the influence of the contact area of the rail on the thickness of the lubricant. When the same contact area, the oil film thickness of the lower oil injection amount is small. The thickness of the oil film with higher oil injection amount is thicker. When the same oil injection volume, the thickness of the oil film of the larger contact area is small.

***Index Terms*—Lubrication, oil film, voltage measurement method.**

I. Introduction

When machinery produces high-precision components, it needs its conditions for high precision, high speed, high efficiency, and the feed system is one of the important key systems of the tool machine. Among them, the ball screw and sliding guide as the main source of heat due to friction of the original. The effects of component heat include structural deformation and mechanism wear. In the end, the overall machining accuracy is greatly reduced.

Combined with the above factors, the advantages and disadvantages of the feed system will directly affect the overall accuracy and reliability of the tool machine, and the error factors affecting the feed system are shown in Fig. 1.

A. Oil Film Measurement Method

Mechanical component lubrication mechanism plays an important role in the joint mechanism system In addition to the most basic lubrication supply, mechanical component cooling, but also affect the processing accuracy. Therefore, the determination of oil film thickness is very important.

Xie Qikai [1]. Used optical multi-beam interference theory to measure the thickness of the oil film, explore the relationship between the thickness of the oil film and the resistance value, understand the relationship between the resistance value and the thickness of the oil film in dynamic situations, the faster the speed of the oil film thickness, the greater the resistance value, the larger the load, the smaller the thickness of the oil film, the smaller the resistance value. This experimental phenomenon is consistent with the Renault procedure, summarizing the above, the most affected factor is the thickness of the oil film, the oil film thickness increases its resistance value.

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B. Feed System Lubrication Analysis

Lubricants provide reduced friction, resistance, cooling, cleaning, rust protection, sealing and earthquake resistance. There are many factors affecting lubricants, as illustrated in Fig. 2.

Joshia *et al*. [2], foreign scholars. Used rheometers and lubricants of different viscosity to do experiments, in which the steel ball sliding on the surface of the object to be measured. A smoother interface can be created, which reduces friction.

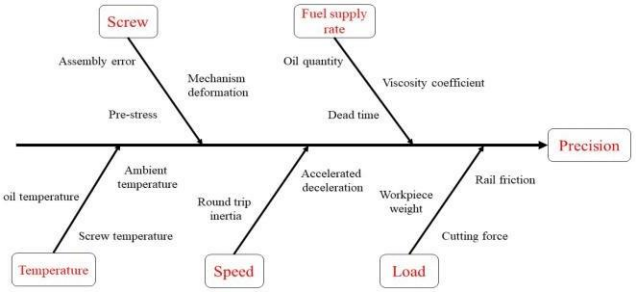

Fig. 1. Factors affecting the positioning accuracy of the feed system.

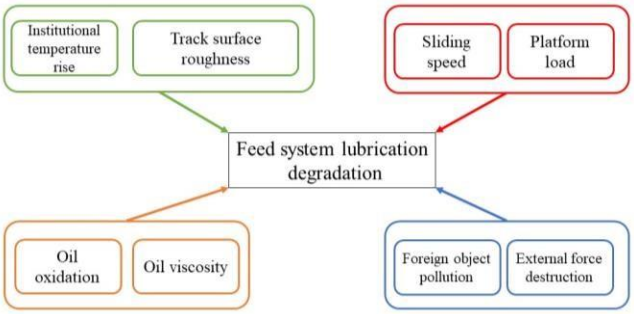

Fig. 2. Lubrication degradation factors of feeding system.

C. Feed System Friction Analysis

The motion mode of feed system drives the ball screw to transmit power to sliding track and sliding seat by servo motor, which forms reciprocating friction action. Therefore, lubricants play an important role in this area, providing benefits such as cooling, corrosion prevention and good sliding, as shown in Fig. 3.

Validation is restricted to the SRT-MRT Lattice Boltzmann Method for Simulating Single-Phase Flows.

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***Abstract*—The multi-relaxation time (MRT) Lattice Boltzmann method (LBM) was developed to overcome several constraints, which are inherent to the more famous single relaxation time (SRT) Bhatnagar–Gross–Krook (LBGK) model. Constraints, such as fixed Prandtl number, fixed ratio between kinematic and bulk viscosity, and Reynolds number limitations undermine the SRT usefulness. Furthermore, the SRT method fails to accurately characterize high viscosity fluids' behavior near the domain's walls, an issue which can be circumvented with the MRT method. However, the MRT requires a careful selection of its relaxation parameters for achieving the desired outcome. The ad-hoc nature of this selection makes the method cumbersome, especially for three-dimensional (3D) domains. Additionally, it is known that the MRT solution requires about 10% - 15% more computational time than the SRT for the same domain size.**

Four widely used single-phase flow conditions were explored by using the SRT and the MRT methods. It is shown that the SRT has good accuracy when used for simulating low viscosity fluid cases; however, the SRT exhibits a non-physical velocity jump at the domain surface boundaries when used for simulating high viscosity fluid flows. This issue can be resolved by augmenting the SRT domain's height, which in turn leads to an increase in the required computational time. The main advantages of the MRT are due to its capability in overcoming the velocity jump in most of the high viscosity fluid cases and in its ability to simulate flows with ultra-low viscosities, which was demonstrated in the characterization of the flow around S822 airfoil with Reynolds number $\mathrm{Re} \approx 40,000$ **.**

***Index Terms*—Lattice boltzmann, multi-relaxation time LBM, LBGK, parabolic flow, S822 airfoil, drag and lift.**

I. Introduction

The MRT LBM was introduced by D'Humières [1] to overcome defects inherent to the Lattice gases, which suffered from important statistical noise due to averaging Boolean variables for calculating the macroscopic variables. At the time, when several researchers simulated the motion of particles by their occupation number rather than their Boolean occurrence and used a relaxation process towards equilibrium prescribed by the kinetic theory, D'Humières suggested the addition of new degrees of freedom for the choice of equilibrium distribution.

Manuscript received November 18, 2019; revised May 3, 2019.

Since its inception, the MRT LBM presented an interesting simulation platform, which attracted the attention of several researchers, who tried to analyze, further develop and use it for simulation cases, which were inaccessible to the SRT LBM users. Lallemand and Lue [2] obtained a generalized hydrodynamics (wave vector dependence of the transport coefficient) by solving the dispersion equation of the linearized lattice Boltzmann equation either analytically or numerically. The authors applied the concept for selecting the adjustable parameters to optimize dispersion, dissipation, anisotropy and the Galilean invariance of their model. The generalized hydrodynamics was used to study the stability of two-dimensional shear flow with shock, in which the simulation results matched their theoretical analysis. D'Humières *et al.* [3], extended the MRT method to D3Q15 and D3Q19 three-dimensional domain, to simulate lid-driven cavity flow for Reynolds numbers up to Re = 2000. J.-S. Wu, Y.-L. Shao [4] simulated two- dimensional near-incompressible steady lid-driven cavity flows with Reynolds number between 100 and 7500 by using MRT and LBGK models. The results were compared with Navier-Stokes simulation results for the same flow domain and flow conditions. The authors reported that the MRT was able to improve the solution convergence, to decrease the spatial oscillations near sharp edges as well as it was successful in simulating high Reynold number cases. The improvements were due to the different relaxation rates used for different physical modes, which were embedded in the MRT scheme. Rui *et al*. [5] proposed an incompressible MRT LBM, with the equilibria in momentum space were derived from a previous LBGK model for incompressible flow proposed by Guo *et al.* [6]. The Model was successfully applied to steady state Poiseuille flow, cavity driven flow and double shear flow in 2D domains. Jafari S. and Rahnama M. [7] used the generalized lattice Boltzmann equation for the computation of turbulent channel flow and compared successfully their results for mean velocity distribution, turbulent statistics and vortical structures with the large eddy simulation with shear-improved Smagorinsky model for the subgrid-scale turbulence effects. The model showed good numerical stability and ease in parallelization.

E. Aslan *et al*. [8] studied the classical case of the two-dimensional lid cavity for incompressible steady laminar flow using the SRT and the MRT methods. For high Reynolds numbers ranging between 200 and 2000, the results were compared with the finite-volume predictions of the incompressible Navier-Stokes equations. The MRT showed more stable results than the SRT for high Reynolds numbers. The authors compared the convergence speed between MRT and SRT within the stability range, and they

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TEM study of nano–scale particles formed in Cu–base alloys

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Keywords: Cu–base alloys; nano–scale precipitates; TEM; magnetic properties

Abstract. The precipitation behavior of nano–scale particles formed in Cu–base alloys was studied by means of transmission electron microscopy (TEM) and SQUID measurements. Linear arrangements of two or more nano–scale particles cubic in shape were observed in the <100> orientations of matrices in a Cu–Co alloy. Although the trend was less explicit in a Cu–Fe alloy, Fe precipitates accompanying twin–like lattice modulations were found in the decomposition, when no deformation was applied. The present SQUID measurements revealed several significant influences to magnetic properties were induced during the precipitation in Cu–base alloys. Lorentz electron microscopy confirmed that phase transformation from $\gamma \rightarrow \alpha$ occurred at the stage that the Fe particles reach to 40~60nm in size.

Introduction

Small magnetic particles are key components for magnetic recording devices. In recent years, the discovery of GMR (Giant Magnetic Resistance) phenomena in alloy systems consisting of magnetic and nonmagnetic elements has invoked scientific interests to the mechanism and the potential to applications. Despite the strong demands for applications, the attainable magnetic properties of such composite materials are subject to complex interactions depending on particle sizes and distribution of the magnetic particles as well as the composition and grain size of the nonmagnetic matrix, utilizing temperature, and processing conditions. Especially, nano–scale magnetic particles embedded in non–magnetic matrices receive the exchange, anisotropy and electro-magnetic interactions. The configurations of the distributed particles are determined under the subtle balance of those interactions. Furthermore, the super–paramagnetism that does not explicitly appear in a bulk states, can appear and give significant influences to the material, when the particles become small in nanometer order. Although the magnetic properties are supposed to be sensitive to the microstructure of the substances, few studies have been conducted so far, to closely investigate the relation between the magnetic properties and the microstructure of the granular magnetic materials [1–7].

The present authors examined the relation between the microstructure and magnetic properties of Cu–Co alloys in a previous study and revealed a specific feature that the fcc β–Co ferromagnetic precipitates tend to be arranged in the <001> orientations and two or more particles are coupled together with a narrow Cu buffer layer. Although both Co and Fe are ferromagnetic elements, it has not fully investigated whether precipitation phenomena occurs and give an influence to the magnetic properties in a similar manner or not, in Cu–Fe and other Cu–X (X: ferromagnetic elements) alloys. Thus, the present study aims at clarifying the details of phase decompositions in Cu–Fe and Cu–Ni–Fe alloys.

Experimental

Three specimens of Cu–Fe and Cu–Ni–Fe alloys were prepared by arc melting with Cu (99.9% in purity), Ni (99.9%) and Fe (99.9%), respectively. The alloy composition examined by X–ray fluorescence spectroscopy (XRF, Rigaku, RIX 2100) is shown in Table 1. All of the Cu–base alloys

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Thermomechanical processing affects the structure and corrosion-mechanical properties of AISI 321 steel.

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Keywords: Thermomechanical Processing (TMP), stainless steel, dislocations, partial disclinations, fragments, recrystallization, corrosion-mechanical strength.

Abstract. The effect of Thermomechanical Processing (TMP) on the fine structure (dislocation density and fragments evolution), recrystallization, carbide transformations and tendency toward intercrystalline corrosion (ICC) and corrosion-mechanical strength of AISI 321 type steels is described. It's shown that the grain size and overall amount of carbide phase has almost no effect on ICC. With an increase in dislocation density a tendency is observed toward a reduction in corrosion rate, but increases with an increase in proportion of recrystallized material. This connection is explained by an increasing of the level of local microstresses, which may be arranged structurally in the form of partial disclinations and aggravate ICC. A new test procedure was developed for estimating the corrosion-mechanical strength of steel. It follows from the obtained data that the hot working with the following accelerate cooling under industrial conditions does not develop a tendency toward corrosion cracking in 3% agueous NaCl solution.

Introduction

It is known, that TMP is effective strengthening method applying austenitic and duplex stainless steels [1-3]. Development of intercrystalline corrosion in corrosion-resistant steels is normally connected with the occurrence of chemical inhomogeneity of the solid solution and precipitation of carbide and carbonitride phases along grain boundaries. This is confirmed by experimental data for the effect of steel chemical composition and heat-treatment schedules on its tendency toward ICC. In addition, the kinetics and degree of development of segregation processes, and also precipitation of excess phases, particle morphology, and their size depend to a considerable degree on the features of the metal matrix structure.

The interconnection of carbide precipitation processes with the dislocation structure has been studied in sufficient detail [4], although the results of studying the effect of matrix substructure on the development of ICC are insufficient and contradictory [5,6]. The lack of this correlation may be connected with the non-uniform effect of average defect density on the reaction capacity of solid solutions, in particular on metal corrosion.

In this work an estimate was made of the effect of structural state governed by hot working on the tendency toward ICC and the corrosion-mechanical strength of AISI321 type steel.

Experimental

The study was carried out with the reheating temperature, T reh=1150^0C and different TMP parameters: reduction (ε=10-50%) and number of rolling passes (n=1-5), the end deformation temperature, Tdef.=1020^0C equal start of the water quenching temperature, Tq for all experiments was constant. The interconnection of structure and corrosion resistance has been studied. The structure has been studied by TEM and light microscopy technique. Tests for ICC were performed by the "AM" and "DU" methods (Russian grade GOST 6032). Testing by the "AM" method for all schedules showed positive results and, therefore, there was greatest interest in tests carried out by the "DU" method, making it possible to make a quantitative estimate of the results obtained.

Results and Discussion

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AN ANALYSIS OF EXPLOITATION ANDEMANCIPATION ALICE WALKER'S "THE COLOR PURPLE"

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ABSTRACT

This paper offers a critical study of Alice Walker's novel *The Color Purple* that portrays the predicaments of the African American women who are subalternized and subjected to myriad forms of oppressive forces in a white and male-dominated society Southern United States. They are exposed not only to white people's racial assaults but also the domestic violence unleashed by their male counterparts. However, apart from highlighting torments and traumas, Walker shows some ways of emancipation. The central character, Celie goes through numerous obstacles in her life but in the end she reclaims her own voice and subjectivity through creative urge and love. There are also other female characters who show extraordinary determination and resilience amidst the antagonistic forces. Shug Avery and Sofia are not subservient and emerge as women of great strength and character as well. As a womanist text *The Color Purple* delineates the subjugation, oppression and exploitation of the black women and the necessary resistance that they must register to survive against the racial and sexist assaults.

Keywords: Subalternized; Racial; Subjectivity; Resistance; Sexist.

Alice Walker called herself a 'womanist'. By this term she implied someone who is "committed to the survival and wholeness of entire people, male and female" ("In Search …." 5, xi). She also said: "I am preoccupied with the spiritual survival of whole of my people. I am committed to exploring the oppressions, the insanities, the loyalties, and the triumphs of black women" (5,250) Walker invented the term 'womanist' from the urge to secure a place for women of color within a feminist culture that she finds overwhelmingly white and bourgeoisie. Walker's novel *The Color Purple* traces the journey of Celie, a black woman from an existence with no agency towards self-assertion. She deconstructs the identity imposed upon her by the hegemonic discourses of patriarchy and asserts her subjectivity. Walker's novel focuses on the exploitation and oppression of the women who suffer continually under the patriarchal domination in a colored segment of a society. If one is woman and that too black, then she is subjected to multiple forms of marginalization. She has to fight against white patriarchy, against sexism of black men and racial abuse of white men and women. As walker writes in her essay, "In search of Our Mother' Gardens", a black woman is the mule of the world, because (she has) been handed the burdens that everyone else- everyone else- refused to carry" (5, 237) The novel narrates in an epistolary manner the thirty years of a struggle in the life of Celie who is embodiment of

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A Study of Poems of Nissim Ezekiel

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Abstract:

Nissim Ezekiel is an important Indian poet who has created almost a new genre of Indian English Poetry. Almost for the first time, the English poetry has become 'native' to India and thus a new vernacularisation process has started with the poems of Nissim Ezekiel. In this context, this research article tries to understand the 'Poetry Reading", a poem representing the poetic world view of Nissim Ezekiel, in the context of the Indian Epistemological systems. This article largely is an attempt also to understand the poetic process through the epistemological categories of Indian Knowledge Systems. This way of studying a poem can be further applied to other poems of Nissim Ezekiel or of other poets. For Nissim Ezekiel, it is even more relevant as it may gradually help us understand the amalgamation of the Occidental language with the Indic creative processes.

Keywords: Indian Epistemology, Poetic processes, Nissim Ezekiel, Means of Knowledge, Poet's epistemology, Reader's epistemology

Nissim Ezekiel (1924-2004) is an important Indian poet who represents in various ways the international consciousness as he may be viewed as an amalgamation of the Abrahamic and Indic cultures. Born in a Jew following, he is often considered a pioneering figure in the Indian English poetry (Dulai, 2000). Nissim Ezekiel's streams of consciousness appears to emanate from the epistemology of various cultural connects as he writes with an Indic sensibility. As Mohammed Shafiqul Islam writes, Nissim Ezekiel "was the first Indian English poet who brought modernity into the Indian English poetry scene. Despite his orientation with and sojourn in the western world – Europe and America – he remained deeply attached to his country of birth. Wherever the poet stayed during his active years of studying, writing, and teaching, his love for India did not diminish as its beautiful landscape always reminded him of his roots – he was deeply rooted in Indian nature and culture." (Islam, 2017)

His musings over the 'poetry' itself in one of his lesser famous poems entitled "Poetry Reading" stands witness to his attachment to the Indian minds. His poetic epistemology can be found to be closely connected to the Indian ways of acquiring knowledge of this world. In this article, we intend to examine the poem "Poetry Reading" by Nissim Ezekiel in terms of epistemology from the Indian systems of understanding and explaining the texts and the world. Since the poem is relatively less famous, though extremely significant due to its epistemology construct of the poetic world, the text of the poem is appended in the paper at the end. Also, in order to understand the epistemological construct of the poem,

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A CRITICAL STUDY OF SELECTED WORKS OFFLORA NWAPA

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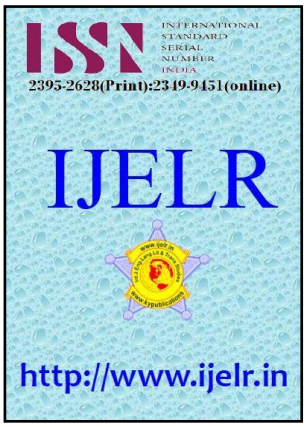

ABSTRACT

In Africa, there is lot of importance given to tradition. They view man's life as an organic growth and decay- similar to the analogy of seasons. Thus the passage of time gives a unique character for a group that would embrace the events of the past in future. The process of reformulating a story into frames with patterns woven from both memory and telling is of significance in the works of black women writers. These women writers present oral tradition as an integral part of their works. This is especially true for the West African women writers of the first generation. The women writers from West Africa use myth as a linguistic mediator between spirit and self. These writers weave the cultural construct of gender in the imaginative texts where women take the roles of 'tellers' and narrate the stories through myths and folktales.

The present paper explores the strategies of collective discourse used by West African women writers like Flora Nwapa to transform the text into a spirit realm by making use of oral traditions. The use of lullabies and praise songs as structural events of language in her novels render a rhythmic quality to the novels. Ancestors and goddesses are a part of these stories that are the primal mythic source for Nwapa. Flora Nwapa uses rituals within the text to draw attention to the cultural patterns that frame the ways of telling these stories.

In traditional African society, a man's life is regarded as an organic growing and dying according to the analogy of seasons. Thus the passage of time gives a unique character for a group that would embrace the events of the past in future. Songs and tales form an integral part of women's lives in Africa as they offer routes into various complex realities and challenges they face in the society. These tales and songs are told by a storyteller or a performer to express both joy and suffering. Jane Marcus says that the written texts of women writers can be linked to the oral traditions of women storytellers and singers:

> "History is preserved not in the art object but in the tradition of making the art object. It is eaten, it is worn; culture consists in passing on the technique of its making. Stories are made to be told, and songs

An Analysis of Woman characters in the work of Shobha De

M. Sridevi

Even in the 21st century the position of women is very shocking and pathetic. Though they are holding the highest positions in the country and breaking the glass ceiling, yet discrimination, violence and social injustice continues against them. Whether they are rural or urban, belong to elite families or normal families, are the victim of social injustice. They are exploited to the extent that they are denied the right to choose their career and spouse and to make other important decisions of their life. Despite the laws of having share in property they are deprived of it.

The status of women is improving with the passage of time. There is awareness among them for their rights and duties. Union General Secretary Antonio Guterres has said that the 21st century must be the century of women's equality.

Many Indian women novelists have dealt with women's issues in their novels and have created different types of images of Indian woman. Women writers like Amrita Pritam, Kamla Das, Kamala Markandaya, Anita Desai and NayantaraSahgal have written on the Indian woman from a woman's perspective. They have painted the Indian woman in different shades and have presented a frank and vivid account of modern and traditional woman.

Shobha De has emerged as one of the most popular women writers in Indian English fiction. Her fiction deals with major issues like displacement and marginalization of women, patriarchal hegemony and male domination. She has created a huge space for women in her fiction. She explores the world of modern urban women of India. This new woman is bold, ambitious, unconventional, tremendously energetic and frank. De says, "*I did write with a great deal of empathy towards women. Without waving the feminist flag, I feel very strongly about the woman's situation.*"(Dodiya Fiction 15). She also says that women in my books are definitely not doormats and are not willing to be kicked around.

Shobha De is a powerful author who writes from a definite feminine perspective. Her women characters revolt against the traditional image of Indian women. De's women are new women who want to lead their life on their own terms. These women love liberty and are fearless. De's women do not care for traditional values as traditional women mostly suffered seriously. They recognise their identity and existence and refuse to suffer. They wish to explore a new world through education and employment.

A deeper study of De's novels like *Socialite Evenings, Starry Night, Sisters, Strange Obsession, Sultry Days* and *Second Thoughts* etc. explore the world of new women in India, these women do not accept to be placed next to men and seek for equal rights and participation.

ShobhaDe's debut novel *Socialite Evenings* created ripples in society with its appearance in 1989. It laid bare the world of high society India. In *Socialite Evenings* the females are victims of patriarchal setup and are in search for identity and selfhood. Karuna, a prominent Bombay socialite is the protagonist of the novel. She sheds her middle-class past to establish her place in high society. Since her childhood she was the victim of patriarchal hegemony. This novel reveals Bombay high society and the lives of bored, rich housewives who are trapped in loveless marriages and are involved in extra-marital affairs. They try to seek the meaning of life in fashionable parties, westernized lifestyle and materialism etc. Karuna's divorce and other affairs have left her shattered and in order to escape these unpleasant memories she starts writing her memoirs. Her memoirs are successful, and she achieves great fame and becomes an active socialite. She asserts her selfhood and lives life on her own terms.

Anjali, Karuna's friend also asserts her selfhood and wants to get out of her middle-class background. She joins Air India as a hostess and marries Abbas Tayabji but soon feels frustrated and suffocated in this relationship. After her divorce from Tayabji, she is involved in many affairs but soon is disenchanted and disillusioned and resorts to spiritualism for peace in

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AN ANALYSIS OF POSTMODERN ELEMENTS IN SALMAN RUSHDIE'S "MIDNIGHT'S CHILDREN"

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Women Empowerment in India

L. Tehseen Khanam

ABSTRACT:Focused on the theory that women are different from men in social roles and that these disparities result in asymmetrical, discriminatory gender power relationships, 'women's empowerment' relates to increasing women's right to influence of their strategic decisions in life and their opportunity to completely grow their potential.As an economic, political and social culture phase, women's empowerment questions the framework of sexual stratification that has contributed to the subordination and marginalization of women to increase the quality of life of women.This review article provides an overviewof women empowerment status in India.

KEYWORDS: Equality, Gender equality, Quality of life, Women empowerment,

INTRODUCTION

The empowerment of women in India depends heavily on various different variables like geographical locations (urban/rural), schooling, social status (caste and class) and age. There are national, state and local (Panchayat) policies on women's empowerment across a range of sectors including health, education, economic opportunity, sex-based abuse and policy engagement.However, substantial differences remain at the group level between legislative change and existing activities[1]. The overwhelmingly patriarchal system that dominates the society and households in much of India is one of the major factors leading to the inequalities in the enforcement of legislation and policies to tackle sexism, economic disadvantages, and violence against women[2]. Women and girls are thus limited to mobility, have access to jobs, have access to health services and have less decision-making capacity.Political representation is still inhibited, in view of current reservations for women, at Panchayat level (local governing bodies), state-level and national level[3].

There is an effect on rural and urban India of the patriarchal system, but the empowerment of women in rural India is much less apparent than in urban areas. This is particularly important because, considering the high urbanization rate and expansion of towns, much of India is rural. Rural women face inequality even higher in and in all spheres of life as compared to women in urban environments[4]. Urban women, and particularly urban educated women, benefit from comparatively greater access, less domestic violence and less access to economic opportunity, health and education.The family and the society have larger decision-making rights for women (both cities and farmland) who have a certain educational degree. In addition, schooling for women hasa significant effect on maternal mortality rates, and on children's nutrition and health indicators. There are additional differences among rural women that obstruct empowerment of women. Education, caste and class distinctions are the most prominent.Lower caste women (scheduled castes, other backward castes and tribal communities) are particularly vulnerable to maternal mortality and child mortality[5]. They also do not have access to health and education, have no authority to vote, and face higher levels of violence. Any education levels of women of lower classes have been found to have positive effects on the indices of women's empowerment.

Social disparities between urban women also affect equally on indices of empowerment. Women of higher schooling and educated learning have greater access to health, jobs and economic opportunity, while less educated women of lesser education have relatively less access to these rights in urban areas. The cities still house large areas of the slum due to the rapid urbanization and lack of economic opportunities in other parts of the world. Slums are informal, and social facilities like clean water, sanitation and health care are frequently scarce. Slums are informal.Furthermore, slum residents operate mostly in unorganized and informal industries, leaving them vulnerable to state seizures, employer violations and other types of insecurity. Women and kids in slums are among the most vulnerable and robbed of fundamental human rights, including harassment and abuse.India's policy/practice deficit in terms of rampancy of graft and lack of good practices decreases in all industriesand initiatives. Governments at state level say that they are without money, and their resources are particularly

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REVIEW ARTICLE

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A CRITICAL STUDY OF R.K.NARAYAN'S' "SWAMY AND FRIENDS''

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ABSTRACT

An artist often based his art on his own life and experience. If we closely observes an artist's life is an evidence. that incidents which greatly affected the author have often been reproduced in his art. R. K. Narayan, Raja Rao, and D.H. Lawrence have written about their experiences in their novels. Narayan, who is considered one of the greatest English language novelists in India, has always written about the world around him. Narayan's takes material from his own life. Certainly This study attempts to prove that an artist may take material for his art from his own life and experiences. His first three novels (Swamy and friends, The bachelor of arts, the English teacher) are semi autobiographical. These trilogies tell the story of Narayan's life from childhood to adulthood. Swami and Friends tells the story of a ten year old named Swami,who is a very similar to Narayan's own childhood.

Key words: Unorthodox, adolescent, bereavement, Malgudi, impulsive, trepidation, belligerent

R.K. Narayan, shortened from Rasipuram Krishnaswami Iyer Narayanaswami, was born in Madras,South India on October 10, 1906. He was an Indian author whose, works of fiction include a series of books about people and their interactions in an imagined town in India called malgudi. He is credited with bringing Indian Literature in English to the rest of the world. *Swamy and Friends*, *The Bachelor of Arts, The English Teacher*, are his popular works. Although The present study extract from *Swamy and Friends*.

Swamy and Friends.

Narayan's first novel *Swami and Friends* was published on October 24, 1935 in London for which Narayan got a cheque of 15 pounds and 10 shillings. It took Narayan two years to complete this novel. *Swami and Friends* is the story of a ten year old name Swami, a boy full of innocence, wonder and mischief, and his experiences in the fictional town of Malgudi, which is similar to Narayan's own childhood. Most of Narayan's novels are based on his own experience in life. His first three novels are considered autobiographical. These works depict the story of Narayan's life from childhood to adulthood.

Narayan's *Swami and Friends* is a semi-autobiographical novel that depicts the growing pain of an adolescent boy, the tears shed by him after he is hurt and the fears he has of losing a friend. Although the ordinary tensions of maturing are heightened by the particular circumstances of pre-partition India, Narayan provides a universal vision of childhood, friendship and grief. Set against the fictional backdrop of Malgudi, the book is

Enhancing Teaching Methods: A Need of the Hour

Dr. T. Sujatha

Abstract **- The participatory methods used represent an important tool for ensuring the educational process. The selection of appropriate method is determined by the aim of the subject. However, the use of a suitable combination of mutual educational methods should be conditional on the individual needs of students and teachers, social needs and trends. The selection should respond to the current global trends in technical, economic, and educational research and development. The implementation of appropriate method is determined by various factors. It is based on the number of students in a group, their present and desired level of knowledge, skills, motivation to learn functional position. The level of expertise, ability to understand the minds of the students and experience of teachers and spatial capabilities are also important. The main aim of this paper is to demonstrate how it is possible to increase the efficiency and attractiveness of the subject at university using participatory methods.**

Index Terms **- Teaching Methods, ParticipatoryMethods, Motivation, Evaluation, Facilitator.**

INTRODUCTION

Education is an important factor that brings about human resource development. Education enables people to build up their capabilities, there by broadening their entitlements, and facilitating expansion of freedom, which in turn is the primary and main means of development. Education is not mere acquisition of knowledge but attaining skills, acquisition of attitude and values, transmission of culture development of personality and liberalisation or self actualisation. Radical changes are taking place in teaching and learning process, especially with the advent of information and communication technology. Society has become more knowledge based and more technology intensive. In this situation teacher cannot rely on traditional ways of teaching. Students are need to be motivated only if the class room environment and teaching methodologies are properly aligned to meet the real life challenges. In order to make the class live and more tentative, teacher should not restrict himself for the subject but also teach live examples and make his teaching to more realistic one and students are able to think present scenario.

Teaching Methods:

The term teaching method refers to the general principles, pedagogy and management strategies used for classroom instruction. The choice of teaching method depends on what fits the teacher - educational philosophy, classroom demographic, subject area(s) and school mission statement. Teaching theories primarily fall into two categories or "approaches" — teacher-cantered and student-cantered

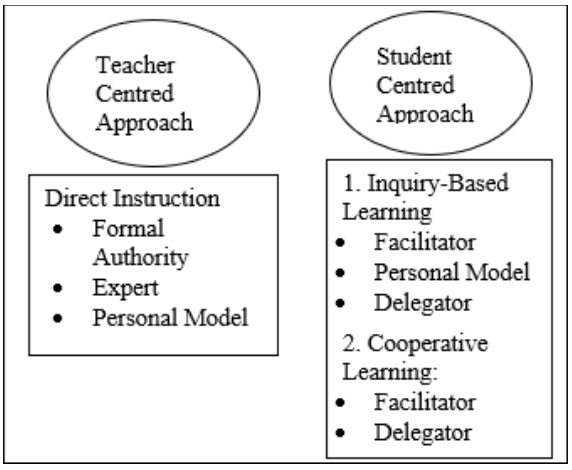

Figure: Teaching methods

Teacher-Cantered Approach to Learning - teachers are the main authority figure in this model. Students are viewed as "empty vessels" whose primary role is to passively receive information (via lectures and direct instruction) with an end goal of testing and assessment. It is the primary role of teachers to pass knowledge and information onto their students. In this model, teaching and assessment are viewed as two separate entities. Student learning is measured through objectively scored tests and assessments.

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The Relationship Between Instructors' Teaching Contexts, Academic and Professional Backgrounds, and Their Uses of Class Time in Mathematics Content Courses for Elementary Teachers

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*This article reports on a national survey of post-secondary mathematics instructors (*n *= 458) of mathematics courses designed for elementary teachers. The article links the use of various instructional practices to instructor characteristics. Specifically, there were statistically significant differences in reported use of class time depending on instructors' subject and level of their degree, their experience teaching in preK–12 classrooms, and whether they perceived the institutions at which they taught as selective. Use of regression models with interactions demonstrate that the relationship between academic and professional background, teaching context, and use of class time was complex.*

Keywords: *teacher education, mathematics content courses, instructional practices*

In the mathematics community, there is a consensus that strategies that actively engage prospective teachers in doing mathematics during class time should be used in the mathematical education of teachers (Association of Mathematics Teacher Educators [AMTE], 2017; Conference

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2020 Vol. 26, No. 1, 3–24

Teacher Candidates' Reflections on Responding to Errors: Investigation Vision and Goals

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Responding to student errors is a complex practice that connects teachers' vision and goals around students, mathematics, and teaching. We explore teacher candidates' (TCs) reflections on responding to errors during rehearsals of whole-class discussion to gain insight into the vision and goals that might influence their thinking. We discuss five TCs' assessment of their practice based on video-elicitation interviews to infer their vision around responding to errors and their associated goals for practice. In particular, we attend to how their vision and goals interact in shaping TCs' reflections on practice. This work offers implications for considering TC development and support.

Keywords: *responding to errors, teacher candidates, video elicitation interviews, reflecting on practice*

Responding to student contributions during whole-class discussion is a complex and critical aspect of the work of teaching (Boerst et al., 2011). That work becomes particularly difficult when the contribution contains a mathematical error, as teachers need to consider how to respond to the error, position students in productive ways, and make progress toward established mathematical goals. Current research around errors and error-handling advocates for embracing errors as

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The Mathematics Educator
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Analysis of Elementary Preservice Teachers′ Identification of Mathematical Problem-Solving Tasks and Divine Student Solutions

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According to the Association of Mathematics Teacher Educators (AMTE, 2017), teachers should first try to see problems through their students' eyes, anticipate, understand, and analyze students' varied ways of thinking, and respond appropriately. In this study, we engaged preservice teachers (PTs) in planning to implement problem-solving tasks; explored how they identified problem-solving tasks; and characterized their anticipated responses to those tasks. PTs' competencies and deficiencies in selecting problem-solving tasks and anticipating solutions were described. The results inform the design of more effective interventions in math methods courses to help PTs to plan for implementation of problem-solving in their future teaching.

The National Council of Teachers of Mathematics (NCTM, 2014) and Common Core State Standards for Mathematics (CCSSM; Common Core State Standards Initiative, 2010) recommended problem solving as part of effective classroom planning and instruction. The NCTM published *Principles to Actions* in 2014 with the goal ―to fill the gap between the development and adoption of CCSSM and other standards, and the enactment of practices, policies, programs, and actions

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College Students' Meanings for Central Angle and Inscribed Angle

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Contributing to research on students' multifaceted meanings for angles (e.g., angles as ray pairs, as regions, and as turns), we report on three undergraduate students' meanings for central and inscribed angles in circles. Specifically, we characterize how these meanings govern their mathematical activities when engaging in a circle geometry task, including their experienced perturbations and reconciliation of those perturbations. Our conceptual analysis reveals that some meanings are productive for students to conceive of a reflex angle in a circle and the correspondence between a central and an inscribed angle, while other meanings are limited.

Angle and angle measure are critical topics in mathematics curricula. Writers of the Common Core State Standards for Mathematics (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010) specify angle-related content in Grade 2 through high school, starting from identification of angles in planar shapes to radian angle measure in trigonometry. Correspondingly, mathematics curricula in the United States convey a variety of angle definitions, such as angles as geometric shapes formed by two rays that share a common endpoint, angle measures as turns, and angle measures as fractional amounts of a circle's circumference. Despite fruitful research findings on students' and teachers' understandings of angles and angle measures (e.g., Clements & Burns, 2000; Devichi & Munier, 2013; Hardison, 2018; Keiser, 2004; Keiser et al., 2003; Mitchelmore & White,

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Making Sense of Geometry Education Through the Lens of Fundamental Ideas

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For many decades, the amount of geometry curriculum worldwide has been cut, mathematics curricula have lacked diversity of geometrical phenomena, and geometry teaching has been reduced to a somewhat eclectic mix of activities. Recently, new trends have begun to counteract these tendencies by framing new curricula around fundamental ideas. The goals of this paper are threefold: (a) to present the structural elements of a coherent geometry curriculum through the lens of fundamental ideas, (b) to develop an analytical tool to determine the fundamental ideas of geometry in children"s drawings, and (c) to provide insight into the images primary grade students have of geometry. The results are discussed not only with regard to the latter of these goals, but also with regard to their theoretical and practical implications.

Geometry is one of the earliest established branches of mathematics; it went through a period of significant growth, particularly during the 19th and 20th centuries, becoming well-known for its internal diversity, coherence, and richness (Jones, 2000). Nonetheless, geometry education did not parallelly undergo the changes and growth in its content and structure. On the contrary, in the past several decades, geometry seems to have lost its position in school mathematics developing the reputation of being the ―problem child‖ of mathematics teaching (Backe-Neuwald, 2000). At the same time the overall amount of geometry has been reduced in many national curricula (e.g., Backe-Neuwald, 2000; Glasnović Gracin & Kuzle, 2018; Mammana & Villani, 1998). Furthermore, some researchers

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The Effect of Math in HighSchool on College Success

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Methods of causal inference are not widely used by education researchers, even though they can be extremely useful tools for eliminating selection bias and confounding factors in empirical studies. For example, researchers have established that taking additional math classes in high school is strongly correlated with success in college and higher earnings. More recent research seeks to show that taking additional math in high school actually causes success in college. Such analyses are difficult because researchers must draw meaning from naturally occurring data, rather than through experimentation. Researchers have employed a few different methods of causal inference with varying levels of success. Studies using the best methods suggest that taking additional courses in high school mathematics does, in fact, cause an increase in college enrollment and future wages. Education researchers should recognize the power of causal inference methods more widely in evaluating treatment effects.

This commentary explores the effect taking additional mathematics courses in high school has on college success. Knowing if additional mathematics has a positive impact on overall college and career success is important to help both government and privately funded educational institutions create policies around the teaching of secondary school mathematics. The question of curriculum effects is used as an illustrative example to show how methods of causal inference can be applied more broadly to help the education research community.

For years, mathematics has been one of the core subjects taught in school. Success in mathematics is often viewed as being critical to overall success in school. Does taking additional math in high school cause college success? Many studies have

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Mathematics Teacher Educators' Interpretations of the Situative Perspective

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In this study, we examined five mathematics teacher educators' (MTEs') interpretation of the situative perspective, who self-identify as holding that perspective. Furthermore, we share how they designed and facilitated their secondary mathematics methods course pertaining to the activities they identified as most important for the course. We discuss the participants' two interpretations of the perspective rooted in the context of teaching and the act of teaching, which seemed to influence their approach to topics of equity but not the types of activities they identified as being most important. Overall, findings from this study indicate there is diversity with respect to how the five MTEs interpret the situative perspective, and that diversity seems to be contextual.

Around the world, and specifically in the United States, there is pronounced variability in mathematics teacher education programs (e.g., Center for Research in Mathematics and Science Education [CRMSE], 2010). This variability may be seen in many programmatic features including the amount of time devoted to preparing prospective teachers (PTs), the number and variety of courses within a program, and the absence of a shared professional curriculum to prepare prospective mathematics teachers (e.g., CRMSE, 2010). For example, there is no shared professional curriculum to prepare PTs of mathematics (Ball, Sleep, Boerst, & Bass, 2009; Zaslavsky, 2007). Another source of variability may be the instructional practices of mathematics teacher educators (MTEs; i.e., university faculty who teach and prepare PTs) as their practices are not widely understood, documented, or disseminated (e.g., Bergsten & Grevholm, 2008;

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Generalization, Acculturation, and Accommodation

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Generalization is critical to mathematical thought and to learning mathematics. However, students at all levels struggle to generalize. In this paper, I present a theoretical analysis connecting Piaget's assimilation and accommodation constructs to Harel and Tall's (1991) framework for generalization in advanced mathematics. I offer a theoretical argument and empirical examples of students generalizing graphing from R^2 to R^3. The work presented here contributes to the field by (a) drawing attention to particular cognitive activities that underpin generalization, (b) explaining empirical findings (my own and others') occurring as a result of particular cognitive activities, and (c) providing implications for influencing student cognition in the classroom.

Generalization is a key component of mathematics. Mathematicians seek general formulae, kindergarteners generalize when they seek the next shape in a pattern, and undergraduates generalize ideas from $\mathbb{R}^2$ to $\mathbb{R}^3$ to $\mathbb{R}^n$. Because generalization is critical to mathematical thought and to learning mathematics, research that investigates how people generalize supports student learning at all levels.

Descriptions of how people generalize often come in the form of frameworks (e.g., Ellis, 2007; Ellis, Tillema, Lockwood, & Moore, 2017; Harel & Tall, 1991). Frameworks provide language to describe and account for qualitative differences in students' thinking and activity. They can also reveal ways students arrive at the same generalization via different means. Frameworks support theory building by providing language to explain and predict phenomena. Because students at all levels often struggle to generalize (Ellis, 2007), developing frameworks and theory about the cognitive activities involved in generalization can inform instruction for students across multiple mathematical levels and topics.

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Mathematical Authority: Three Cases of Preservice Teachers' Algebraic Justifications

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Students' ability to reason for themselves is a crucial step in developing conceptual understandings of mathematics, especially if those students are preservice teachers. Even if classroom environments are structured to promote students' reasoning and sense-making, students may rely on prior procedural knowledge to justify their mathematical arguments. In this study, we employed a multiple-case-study research design to investigate how groups of elementary preservice teachers exercised their mathematical authority on a growing visual patterns task. The results of this study emphasize that even when mathematics teacher educators create classroom environments that delegate mathematical authority to learners, they still need to attend to the strength of preservice teachers' reliance on their prior knowledge.

Self-efficacy in mathematics depends on having a sense of mathematical authority (Keazer & Menon, 2016; Lloyd & Wilson, 2000; Webel, 2010); that is, learners of mathematics need to rely on their own sense-making in mathematics in order to develop conceptual understandings of mathematics. It is of particular importance that mathematics teacher educators provide preservice teachers (PSTs) opportunities for developing mathematical authority for two reasons: (a) As future teachers, PSTs need to be able to trust their own mathematical self-efficacy (Ball, 1990); and (b) experiencing a mathematics class in which mathematical authority is shared can encourage PSTs to share authority with their students in their own future classrooms. However, elementary PSTs may have limited experience with sense-making in their own schooling, causing

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Mathematics Teacher Developers' Views of a Representation Classes

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This article examines the professional vision of mathematics teacher developers during a professional development experience that featured observations of a content course for elementary teachers. The researchers examined whether these mathematics teacher developers viewed the demonstration class as an analysis class serving as a site for reflection and analysis, or a model class serving as an example of teaching to be emulated. Results indicated participants could hold either view and, in some cases, both. Each view provided opportunities for professional reflection, but particular aspects of the experience promoted an analysis class view.

Reports have cited an urgent need for improving both the quality and size of the mathematics teacher workforce in the United States (e.g., National Science Board, 2007). Widespread adoption of the Common Core State Standards (National Governors Association Center for Best Practices [NGA] & Council of Chief State School Officers [CCSSO], 2010) and its emphasis on engaging students in mathematical practices has heightened this need. Undertaking a task of this complexity and scale requires a cadre of professionals who prepare and provide ongoing professional education of mathematics teachers (Sztajn, Ball, & McMahon, 2006). Several definitions of *teacher educator* have emerged in the literature (John, 2002).

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Second Graders' Self reflective Actions in Problem Solving Revealed Through Action Cards

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Despite the important role that metacognition plays in school mathematics, attention has only recently turned to primary grades. The aim of this exploratory qualitative study was to find out to what extent 6 second graders engage in metacognitive behaviors during mathematics problem-solving. The analysis was based on the adaptation of the multi-method interview approach, whose core idea lies upon using action cards consisting of metacognitive cues. The results show that even young children engage in different metacognitive actions. However, the use of action cards revealed some drawbacks with respect to studying young children's metacognition during mathematics problem-solving.

Over the years, metacognition has been linked to improved student outcomes (e.g., Hattie, 2009; Wang, Haertel, & Walberg, 1993), especially in the field of mathematics. Metacognition has been advocated as an important factor in student learning and as a driving force during problem solving (e.g., Depaepe, DeCorte, & Verschaffen, 2010; Schoenfeld, 1985b; Veenman, Van Hout-Wolters, & Afflerbach, 2006). For that reason, there has been a long-standing effort to increase students' ability to engage in problem solving by providing them with instruction rich with metacognitive activities (e.g., Boekaerts, 1977; Brown, 1978; Desoete, Roeyers, & Buysee, 2001; Garofalo & Lester, 1985; Goos & Galbraith, 1996; Kramarski, Mevarech, & Arami, 2002; Schraw, 1998).

More recently, there is increasing evidence that young children (birth to 8-year-olds) who are provided with proper tasks and enough time to work on them do exhibit metacognitive

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Pre-Service MathematicsTeachers' Opportunities to Learn Reasoning and Proof in Algebra

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This study examined opportunities provided for preservice secondary mathematics teachers (PSMTs) to learn reasoning and proof in algebra from the perspective of college instructors. We analyzed interview transcripts of 15 course instructors recruited from three teacher education programs in the United States. We examined the reported opportunities provided for PSMTs to engage in proving-related activities, including making conjectures, investigating conjectures, developing arguments, evaluating arguments, and disproving by using counterexamples. We also analyzed instructional strategies reported by the instructors. We found the inconsistency between instructors' perceptions of the importance of reasoning and proof in algebra and instructor-reported opportunities to learn. Findings also indicated that developing arguments was reported the most frequently. In addition, instructors reported more pedagogy-focused general teaching strategies than proof-specific teaching strategies.

School algebra emphasizes the "relationship among quantities, including functions, ways of representing mathematical relationships, and the analysis of change" (National Council of Teachers of Mathematics [NCTM], 2000, p. 37). Algebra is a strand of the school mathematics curriculum and should be accessible to all pre-K-12 students (NCTM, 2014). Algebra is considered the gatekeeper for higher mathematics (National Mathematics Advisory Panel, 2008). Thus, having equal access to algebra learning is crucial in building social equity (Moses & Cobb, 2001). The importance

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A Genetic Decomposition of Probabilistic Independence

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The purpose of this research is to construct a preliminary genetic decomposition delineating the mental constructions underlying probabilistic independence. This delineation is considered within the framework of APOS theory. While the use of the term independence in probability is often conflated with causation, the definition relies instead upon an understanding of conditional probability. I hypothesize that the concept of independence is only fully available to students by constructing at least an object conception of probability. I offer additional hypotheses, supported by literature and anecdotal teaching experience, regarding students' quantification of probability and construction of combinatorial reasoning.

Many researchers have documented the overwhelming difficulty students experience in trying to construct appropriate understandings of probabilistic tasks (Jones, Langrall, Thornton, & Mogill, 1997; Tarr & Jones, 1997). In particular, the concept of independence and dependence of events is problematic. Shaughnessy (2003) indicates that "students have difficulty just sorting out the mathematics of whether events are statistically dependent or independent in probability problems" (p. 221). Many researchers (D'Amelio, 2009; Nabbout-Cheiban, 2017; Ollerton, 2015) agree that this is due to a disconnect between an intuitive sense of the terms as they are generally used in the English language and the mathematically correct definitions.

The conditional definition for independence is at times problematic for students as it occasionally works in contrast to the students' colloquial sense of the word. The definition is as follows: Two events, *A* and *B*, are independent if and only if the occurrence of event B has no effect on the probability of the occurrence of event *A*. That is, $P(A) = P(A|B)$ and $P(B) = P(B|A)$ (Grinstead & Snell, 1997). Dependent events are

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Original Research Paper

Dual Solutions for the Problem of Mixed Convection Flow Through a Porous Medium Using an Iterative Finite Difference Method

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Abstract. The aim of this article is to approximate the multiple solutions of the problem of mixed convection in a porous medium on the half-line utilizing the quasilinearization method (QLM) combined with the finite difference method (FDM). For this purpose, at first, we transform the governing nonlinear differential equation to a sequence of linear differential equations via the quasilinearization approach. Then, we provide a sequence of linear algebraic systems by applying the FDM at each iteration to find the approximate solutions of the obtained linear differential equations. Moreover, we present a beneficial scheme to obtain appropriate initial guesses in order to compute both solutions of the problem. The convergence analysis is considered in detail and

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Children's Multiplicative Reasoning: Initial Validation of a Written Assessment

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Multiplicative reasoning is essential for students' engagement with various mathematical concepts. Although the field's understanding of children's multiplicative concepts has grown over the past 30 years, relatively few studies have examined the development of multiplicative concepts with whole numbers, and even fewer have studied this phenomenon at scale. The present study reports on the development of an assessment of elementary students' multiplicative concepts with whole numbers that can be used at a large scale. Findings suggest the initial version of the assessment has sufficient reliability and validity. Further, less than 20% of second grade students and approximately 50% of third grade students participating in the study engage in tasks with at least the first multiplicative concept.

Multiplicative reasoning is essential for students' development of a meaningful understanding of rational number (Confrey & Harel, 1994; Hackenberg & Tillema, 2009). In addition to other frameworks, it is often described in reference to Hackenberg's (2010) work on three multiplicative concepts in which each subsequent multiplicative concept is characterized by more sophisticated unit coordination. Multiplicative concepts are researchers' models for schemes constructed by students as a product of their prior counting schemes (Steffe, 1994). Each multiplicative concept is associated with a particular way of engaging in activities involving multiplicative relationships. For example, students who have constructed the third multiplicative concept (MC3) are generally more successful in working with

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Synthesis of Graphene oxide nanocomposite and its spectral characterization

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Abstract: ***In the present study, clay - graphene oxide nano composite catalysts were successfully used for the first time in the multi component one pot organic synthesis. The facile development of the hybrid clay - graphene oxide based materials has been achieved by a cost effective method without the use of any surfactants. The partial reduction of graphene oxide, upon incorporation of clay layers and subsequent heat treatment, is evident from the X-ray diffraction patterns and FTIR spectra of the samples. XPS and ^{27}Al and ^{29}Si NMR spectral analyses provide useful information regarding the interaction between clay layers and graphene oxide through Si-O-C and Al-O-C bonding. The deconvoluted spectrum of O (1s), Al (2p) and Si (2p) indicates the increased availability of acidic functionalities in the hybrid nanocomposite. FESEM and TEM photographs show the random distribution of the clay nanoflakes over the graphene oxide sheets and this could provide more of the active sites for catalysis. Synthesis of 3, 4- dihydropyrimidinones by the one pot Biginelli reaction was done over the present clay - graphene oxide heterogeneous catalysts with high product yield. Short time period of reaction and excellent reusability up to 8 repeated cycles under solvent free conditions are the key advantages of the present highly active hybrid nanocomposite clay - graphene oxide catalysts over most of the other reported catalysts used for Biginelli reaction.***
Keywords: graphene oxide catalysts, nano composite catalysts

I. INTRODUCTION

Multicomponent reaction (MCR), one of the powerful tools for modern synthetic chemists (Weber, 2002), involves coupling of more than two starting materials in a one pot reaction condition to form a single complex product containing most of the atoms of the staring reagents (Hulme and Gore, 2003; Ugi et al., 1994)[1]. Biginelli reaction is a well- known MCR, which involves the synthesis of 3,4- dihydropyrimidinone (DHPM) by one pot condensation reaction of an aldehyde, ethyl acetoacetate and urea in ethanol (Biginelli, 1893; Kappe, 2000). The Biginelli analogues are famed for their biological activities such as antibacterial, antimalarial, anticancer, antiviral, anti- tuberculars, and anticonvulsants (Hentrich, 1932; Akhaja and Rava, 2011; Ramachandran et al., 2016; Prashantha Kumar et al., 2009). Also, DHPM is the core structure of natural marine alkaloid batzel-ladine which is used for the inhibition of the binding of HIV gp-120 to CD4 cell (Snider et al., 1996; Rama Rao et al., 1995)[2]. There are many reports on Biginelli reaction over various homogeneous and heteroge- neous catalysts. The catalysts such as ion exchange resins (Joseph et al., 2006), YbCl3 (Zhang et al., 2009), triphenylphosphine (Debache et al., 2008), propane phosphonic acid (Zumpe et al., 2007), phenylboronic acid (Debache et al., 2006), sulphamic acid (Chen et al., 2007), and sulphated carbon (Moghaddas et al., 2012) were used for the synthesis of DHPMs via Biginelli reaction. All these works are valuable; however, many of them encompass drawbacks such as the use of hazardous and/or expensive reagents, prolonged reaction time, low yield, tedious workup, and requirement of stoichiometric amounts of catalysts; in addition some of the reported procedures also cause envi- ronmental pollution. Nowadays, modern green practices give more attention towards the development of environmentally friendly, effi- cient and synthetic chemical procedures. In this perspective, in order to conquer the drawbacks of the above mentioned procedures and to accomplish most of the aspects of green and sustainable chemistry, the use of highly active low cost nonhazardous heterogeneous catalysts is essential (Herrmann and Cornils, 1997; Wilson and Clark, 2000)[3].

The thinnest material graphene has got much attention from vari- ous researchers because of its extraordinary thermal, electrical and mechanical properties (Geim and Novoselov, 2007; Geim and MacDonald, 2007; Novoselov et al., 2004)[4]. Owing to its high surface area, graphene is well established as a solid support for various metals and metal oxides and the prepared composite materials were effectively used as catalysts (Lu et al., 2009; Bruno and Machadoab, 2012; Liang et al., 2011). Among the various methods of preparation of graphene, better yield is obtained by the reduction of graphene oxide (GO) Park and Ruoff, 2009; Tapas et al., 2012. Even though the use of GO is exploited in various applications such as supercapacitors, photocatal- ysis, heterogeneous catalysis, electrocatalysis, fuel cells and solar cells (Kamat, 2011; Zhou et al., 2010; Seger and Kamat, 2009; Li et al., 2010), the use

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ENZYMATIC SYNTHESIS OF NIGELLIDINE &NIGELLICINE BY THE HETEROCYCLIC RINGS OF PYRAZOLE AND INDAZOLE RING SYSTEMS

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ABSTRACT

The arena of synthetic organic chemistry has advanced greatly from the various current advances in selective C–H functionalization. Undeniably, chemical oxidations of C–H bonds are of the furthermost important transformations in synthetic chemistry since they agree for direct contact to oxidized intermediates, without the need for synthetic handles or functional group interconversions. Despite recent advances, there remain significant limitations regarding the regioselectivity of non-directed C–H oxidation reactions. Since N. sativa L. acts as a wide variety of pharmacological actions discussed previously and updated in this report, interest has arisen in the total synthesis of the alkaloids isolated having the isoquinoline and indazole motifs. The methanolic extract of the seeds contain two types of alkaloids whilst the major principal active ingredient isolated from the volatile oil of N. sativa L. is TQ. The alkaloid isoquinoline comprise nigellicimine & nigellicimine-N-oxide, the indazole alkaloids encompass nigellidine and nigellicine.

KEYWORDS: Nigellicimine, Nigellicimine-N-oxide, Nigellidine, Nigellicine, Indazole alkaloids, Isoquinoline & Nigella sativa

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Original Article

Anomaly Detection In Traffic Video Surveillance

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Abstract: Nowadays, the traffic anomalies goes on increasing because of the day by day increment of numerous vehicles on the road. There are different anomalies related to the traffics such as traffic jam, vehicles on zebra crossing, etc. are recorded. The manual process to handle such traffic rule violation is difficult, time consuming and required more manpower. Hence to avoid the limitation of the existing system, an automated traffic surveillance system has been proposed.

In the proposed system, two traffic anomalies i.e. vehicle on zebra crossing, signal detection and traffic jam (based on the density of the traffic) are consider for implementation. It visualizes the reality so it functions much better than those systems that rely on the detection of vehicles metal content. This system can be useful to capture the culprit and better for the traffic controlling. The proposed system is implemented using OpenCV an image processing library with python language. The proposed system is planned to be implemented on the raspberry Pi hardware platform which is easy to make system portable and real time.

Keywords: Surveillance, zebra crossing, Signal detection, Traffic jam, OpenCV, Raspberry Pi etc.

I . Introduction:

A vast number of reports and statistics state the vulnerable role played by pedestrians in traffic accidents, especially in those who take place in surroundings considered safe by them. Walking is a