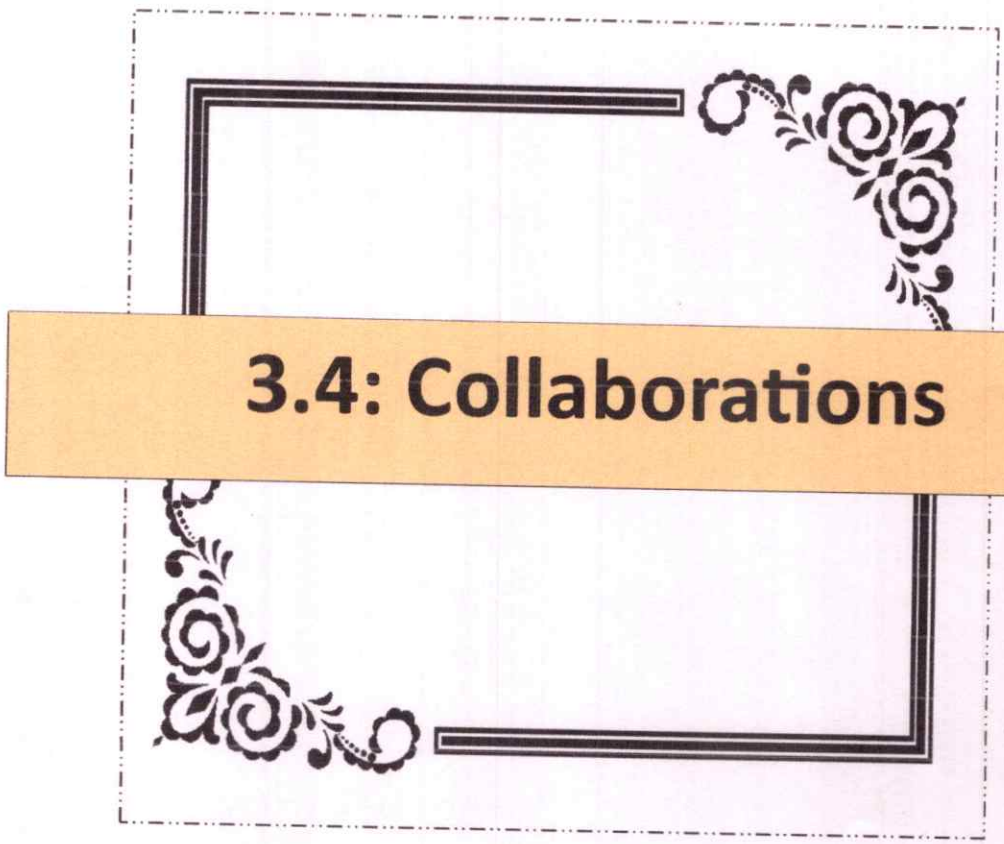


3.4: Collaborations

3.4.1 The Institution has several collaborations/linkages for faculty exchange, Student exchange, Internship, Field trip, On-the-job training, research etc. Conducted by Institution during the year

3.4.1 The Number of Collaborative activities for research, Faculty exchange, Student exchange/ internship during the last year

Sr. No	Title of the Collaborative activity	Name of the partnering institution /industry/research lab with contact details	Year of commencement	Duration	Nature of Collaborative activity
1	Research	Department of Chemistry, Fluroscence Spectroscopy Research Laboratory,Shivaji university,Kolhapur	2023	1 Year	Research paper Published on Facile Synthesis Of Sulphur –Doped Carbon dots (S-CD_S) Using a hydrothermal method for the selective sensing of Cr^{+6}andFe^{3+} Ions: Application to environmental Water sample Analysis
2	Research	Pratap College Amalner ,India	2023	1 Year	Research paper Published on Synthesis of CoO,NiO Nanoparticles,CoO@pani and NIO @pani Nanocomposites CoNiO2,CoNiO2 Doped PANI and Investigation of its Photocatalyst activity
3	Research	Yashwantrao Chavan Institute of Science, Satara	2023	1 Year	Research paper Published on Synthesis of 1,8-dioxodecahydroacidines via Hantzsch condensation using theophylline in an aqueous medium :eco – Friendlyy and bio-based approach
4	Research	Sambhajirao Kadam College,Deur ,Satara, Solapur	2024	1 Year	Research paper Published on Curvelet Transform as an Extension of Wavelet Transform and its

					Operational Calculus
5	Research	Department of Botany ,Sadguru Gadge Maharaj College,Karad	2023	1 Year	Research paper Published on Effect of media on isolates colletotrichum Gloeosporioides causing anthracnose Disease of Custard Apple (Annona Squamosa),
6	Research	Department of Zoology Shri Yashwantrao Patil Science College, Solankur	2023	1 Year	Research paper Published on Traditional fishing gears and fishing practices from radhanagri tehsil, Kolhapur District, Maharashtra
7	BOOK	Lap Lambert Academic Publishing House, Germany	2017	Valid till date	Book Published
8	Research	Department of Economics, Shivaji University, Kolhapur	2024	1 Year	Research paper Published on Unmasking the Shadows: Understanding and Preventing Digital Fraud in UPI
9	Research	Department of Physics ,Government Polytechnic, Khamgaon, Buldhana	2024	1 year	Research paper Published on Stronger Self –Focusing of Gaussian Laser Beam in Collisionless Plasma Based Exponential Density Profile
10	Research	Department of Mathematics, Shivaji university ,Kolhapur	2024	1 Year	Research paper Published on Construction of Curvelet Transform as an Extension of Wavelet Transform

11	Book	Department of chemistry, Vivekanand College, Kolhapur	2024	3 Years	B. Sc Part II Semester IV Inorganic Chemistry Book
12	Book	Department of Chemistry Lal Bahadur Shashtri College,Satara	2024	3 Years	B. Sc Part II Semester IV Organic Chemistry Book

Chairman

Criterion - II

RAJARSHI CHHATRAPATI SHAHU COLLEGE ★ KOLHAPUR

Principal

I/C Principal,
Rajarshi Chh. Shahu Colle...

RSC Advances

ROYAL SOCIETY OF CHEMISTRY

PAPER

Check for updates

Cite this: *RSC Adv.*, 2024, 14, 3473

Facile synthesis of sulphur-doped carbon dots (S-CDs) using a hydrothermal method for the selective sensing of Cr^{6+} and Fe^{3+} ions: application to environmental water sample analysis

Akanksha G. Kolekar,[ab] Samadhan P. Pawar,[*ac] Dattatray B. Gunjal,[a] Omkar S. Nille,[a] Prashant V. Anbhule,[a] Sneha V. Koparde,[ac] Ngoc Quang Nguyen,[e] Daewon Sohn,[e] Govind B. Kolekar,[a] Gavisiddappa S. Gokavi[d] and Vishalkumar R. More[*b]

Received 5th November 2023
Accepted 23rd December 2023

DOI: 10.1039/d3ra07545a

rsc.li/rsc-advances

In this work, we used a one-step hydrothermal method to synthesize blue-emission sulfur-doped carbon dots (S-CDs) using jaggery as a carbon precursor. The synthesized carbon quantum dots showed low toxicity, good water solubility, anti-interference properties, and stable fluorescence. When excited at 310 nm, the S-CDs produced bright emission with a quantum yield of 7.15% at 397 nm. The S-CDs exhibited selective and sensitive quenching responses with limits of detection (LODs) of 4.25 μg mL^{-1} and 3.15 μg mL^{-1} for variable concentrations of Cr^{6+} and Fe^{3+}, respectively, accompanied by a consistent linear relationship between fluorescence intensity and these concentrations. Fluorescence lifetime measurements were used to investigate the fluorescence quenching mechanism, which supports the static type of quenching. Outstanding benefits of the developed S-CD based fluorescence probe include its low cost, excellent sensitivity and selectivity, and ease of use for the detection of Cr^{6+} and Fe^{3+} ions. The developed carbon dot based fluorescent probe was successfully used to detect Cr^{6+} and Fe^{3+} ions in real water samples with an excellent recovery ratio.

Introduction

Pollution of heavy metals is a critical concern owing to its harmful effects on the environment and human beings. Heavy metals such as cobalt, iron, mercury, chromium, and lead have a high chemical toxicity toward biological organisms.[1,2] Among them, iron (Fe^{3+}) and chromium (Cr^{6+}) are the most common metal pollutants detected in environmental water bodies.[3,4] Chromium exists in two oxidation states: Cr^{3+} and Cr^{6+}.[5] Cr^{3+} is an essential nutrient for organisms as it exhibits little toxicity and no harm; however, owing to its high oxidation potential, high levels of Cr^{6+} have mutagenic and carcinogenic effects on the human body.[6,7] The United States Environmental Protection Agency recommends that the concentration of Cr^{6+} in potable water should be lower than 100 μg L^{-1}.[8] Therefore, it is necessary to monitor the concentration of Cr^{6+} in real water samples. Fe^{3+} is one of the heavy metals and a main source of water pollution. Therefore, it causes big problems for human health. In cell functioning and biological metabolism, a trace amount of iron (Fe^{3+}) plays an important role in the human body but an excessive amount can put pressure on the liver and subsequently lead to a series of liver diseases.[9] Additionally, the accumulation of Fe^{3+} ions in the environment will cause a great threat to living organisms.

Several approaches have been developed for the accurate and precise detection of Cr^{6+} and Fe^{3+}, including colorimetry,[10,11] electrochemical methods,[12,13] atomic absorption spectrometry, inductively coupled plasma-mass spectrometry,[14–16] chromatography,[17,18] and organic molecular probes.[19,20] However, most of these methods require special instrumentation, hazardous chemicals, and complicated synthesis as well as exhibit water dispersibility of organic molecular probes, low selectivity, and high detection limits. On the contrary, the fluorescence based detection method has many advantages, such as high selectivity, wide linear dynamic range, small interference, low detection limit, and simple sample pretreatment.[20–22]

Carbon dots (CDs) are environment friendly fluorescent nanomaterials exhibiting low toxicity, good water solubility, and

[a]Fluorescence Spectroscopy Research Laboratory, Department of Chemistry, Shivaji University, Kolhapur 416004, Maharashtra, India. E-mail: sampawar1987@gmail.com

[b]Department of Chemistry, The New College, Kolhapur 416012, Maharashtra, India. E-mail: morevishalkumar@newcollege.ac.in

[c]Department of Chemistry, Rajarshi Chhatrapati Shahu College, Kolhapur 416003, Maharashtra, India

[d]Department of Chemistry, Shivaji University, Kolhapur 416004, Maharashtra, India

[e]Department of Chemistry and Research Institute for Convergence of Basic Science, Department of Chemistry, 222 Wangsimni-ro, Seoul 04763, South Korea

'RESEARCH JOURNEY' International E- Research Journal | E-ISSN : 2348-7143
Special Issue - 333 : Innovative & Sustainable Chemistry | December - 2023
Impact Factor 6.625 (SJIF) | Peer Reviewed Journal

Synthesis of CoO, NiO Nanoparticles, CoO@pani and NiO@pani Nanocomposites $CoNiO_2$, $CoNiO_2$ Doped PANI and Investigation of its Photocatalyst Activity

Ramdas S. Suralkar[1], Deepak M. Nagrik[2], Umesh S. Shelke[3] Ravi S. Balaskar[4]
[1] Pratap College Amalner (M.S.) India.
[2] G. S. College Khamgaon (M.S.) India
[3] Rajarshi Chhatrapati Shahu College Kolhapur (M.S.) India
[4] Pratap College Amalner (M.S.) India

Abstract:

The use of ZnO, TiO_2 as photocatalyst for dye degradation has been reported with varying conc, pH, temperature conditions. The catalyst can be prepared by various method includes hydro thermal, Co-precipitation, gel filtration techniques. In this work Synthesis of CoO, NiO Nanoparticles, CoO@Pani and NiO@Pani nanocomposites $CoNiO_2$, $CoNiO_2$ doped PANI as photocatalyst for dye degradation are synthesize by Co-precipitation method.

Keywords: Dye degradation. Photocatalyst, nanoparticles, nanocomposites

1. Introduction:

Large quantities of toxic organic dyes are produced in the industry, which can cause many environmental problems and result in varying types of cancer throughout humans. Therefore, the development of cheap and environmentally friendly methods to remove these hazardous materials from the environment and underground water has become a critical challenge. In recent decades, the progressed photocatalysts have attracted a lot of attention, as well as the interest of many that consider the usage of photocatalyst technology as a new approach in discovering a solution for cleaning environmental pollutants. Healthy water is defined as the water that has lost its toxic chemicals and pathogens, and its existence is essential for continuing life. Besides, water stands as a vital raw material in many major industries including electronics, medicine, and food technologies. Nowadays, the transit of science and technology, along with the rapid progress of varying fields of technologies, have been able to provide new resolutions and achievements in various areas of science, especially throughout the treatment of industrial wastewater and sewage. Nanoscience has an exceptional stance on the subject of recognizing and eliminating various organic pollutants. Recently, the advent of novel technologies in the treatment of water and industrial waste has provided and introduced new resolutions, which involve the utilization of nanotechnology.

2. Experimental:

2.1 Material:

Aniline monomer, Ni $(NO_3)_2.6H_2O$, Co $(NO_3)_2.6H_2O$, ammonium persulfate (APS), acetone, methanol and hydrochloric acid all of GR grade, are purchased from a Merck (India) company, and they were used as received without further purification process. Double distilled water was used throughout this work.

2.2 Synthesis of CoO nanoparticles:

100 ml of 0.5 N NaOH is added drop by drop to the solution of 100 ml of 0.1N Co $(NO_3)_2.6H_2O$ with constant stirring for 1 hr. after complete addition the mixture is stirred for 2 hrs. then the precipitate is filtered and washed 2 to 3 times with distilled water and kept in an

oven at 40 ^{0}C for 48 hrs for complete drying. Then the ppt is calcinated in a muffle furnace for 3 hrs at 500 ^{0}C to get CoO nanoparticles.

2.3 Synthesis of CoO nanoparticles

100 ml of 0.5 N NaOH is added drop by drop to the solution of 100 ml of 0.1N Co $(NO_3)_2.6H_2O$ with constant stirring for 1 hr. after complete addition the mixture is stirred for 2 hrs. then the precipitate is filtered and washed 2 to 3 times with distilled water and kept in an oven at 40 ^{0}C for 48 hrs for complete drying. Then the ppt is calcinated in a muffle furnace for 3 hrs at 500 ^{0}C to get CoO nanoparticles.

2.4 Synthesis of CoO@Pani nanocomposites

Take 10 ml of 1 M HCl solution in a 250 ml RB flask and add 0.1 gm of CoO nanoparticles in it. The mixture is sonicated in an ultrasound bath for 30 minutes. 1 ml aniline is added in 100 ml 1 M HCl solution in a beaker. This solution is added in RB flask and sonicated for 30 minutes.2.84 gm of ammonium peroxy sulphate (APS) equal molar with aniline is added in 100ml 1M HCl solution in a beaker. This solution is filled in a burette and added dropwise to the mixture in an RB flask kept on magnetic stirrer. This RB flask is kept in glass bowl filled with ice to maintain temperature below 4 ^{0}C to achieve polymerization of aniline to polyaniline (Pani). green colour is developed to the mixture which indicate start of polymerisation reaction. After complete addition of APS solution, the mixture kept on constant stirring for 1 hr. the solution is filtered and washed several times with distilled water and kept in an oven at 45 ^{0}C for complete drying. The dried powder is obtained as 10% CoO doped Pani as nanocomposite.

2.5 Synthesis of NiO@Pani nanocomposites

Take 10 ml of 1 M HCl solution in a 250 ml RB flask and add 0.1 gm of NiO nanoparticles in it. The mixture is sonicated in an ultrasound bath for 30 minutes. 1 ml aniline is added in 100 ml 1 M HCl solution in a beaker. This solution is added in RB flask and sonicated for 30 minutes.2.84 gm of ammonium peroxy sulphate (APS) equal molar with aniline is added in 100ml 1M HCl solution in a beaker. This solution is filled in a burette and added dropwise to the mixture in an RB flask kept on magnetic stirrer. This RB flask is kept in glass bowl filled with ice to maintain temperature below 4 ^{0}C to achieve polymerization of aniline to polyaniline (Pani). green colour is developed to the mixture which indicate start of polymerisation reaction. After complete addition of APS solution, the mixture kept on constant stirring for 1 hr. the solution is filtered and washed several times with distilled water and kept in an oven at 45 ^{0}C for complete drying. The dried powder is obtained as 10% NiO doped Pani as nanocomposite.

3. Result and Discussion:

3.1 Measurement of Photocatalyst Activities:

The photocatalytic degradation of Methyl orange (MO), Congo red (CR) and Crystal violet (CV) dyes was performed under the irradiation of natural sunlight in the presence of the NiO, CoO nanoparticles or the NiO@Pani and CoO@Pani nanocomposite as catalyst. In the photocatalytic treatment of the dyes, a known concentration (50 ppm) of the dye solution was taken in a beaker. 1mg/ml of catalysts was added to the dye solution. Before irradiation of the dye solution, the suspension was stirred for 10 min to realize adsorption–desorption equilibrium in the presence of the catalyst. This procedure was applied to all dye solutions. After that, the suspensions were irradiated without stirring. In order to determine the photocatalytic activity of the catalyst under natural sunlight irradiation, all experiments were done under open atmosphere

and clear sky between 1:00 p.m. and 5:00 p.m. when the solar intensity fluctuations were minimal, in the months of March and April 2023. The photocatalytic degradation of organic dyes was investigated at room temperature in the presence of different catalysts, under sunlight irradiation. The concentrations of MO, CV and CR organic dyes were analysed using visible colorimeter. The degradation efficiency of dye is calculated by the following equation:

$$\textbf{degradation (\%)} = \frac{Co - Ct}{Co} .100$$

where C_0 is the initial concentration of dye before irradiation and C_t is the concentration of dye after a certain irradiation time.

3.2 Possible Mechanism of dye degradation

The general understanding of the photocatalysis mechanism is that the photo absorption of a semiconducting material causes the electrons to excite from the valence band (VB) to the conduction band (CB), leaving positive holes in the VB resulting in the electron–hole pair e_{CB}^- / h_{VB}^+ generation. It is known that PANI homopolymer is a conducting polymer. Photons are absorbed by the PANI homopolymer or the PANI/metal oxide catalyst when the energy (hv) is equal to or greater than the semiconductor band gap, and electron–hole pairs are generated in these semiconducting materials (SCM)

$$SCM\ (NiO, CoO, PANI/NiO, PANI/CoO) + hv \longrightarrow (e_{CB}^-)_{SCM} + (h_{VB}^+)_{SCM}$$

Then, the photogenerated electron–hole pairs migrate to the surface of the catalyst and react with the species adsorbed on the surface.

$$O_2 + (e_{CB}^-)_{SCM} \longrightarrow O_2^{\cdot -}$$

$$O_2^{\cdot -} + 2(e_{CB}^-)_{SCM} + 2H^+ \longrightarrow H_2O_2$$

$$(e_{CB}^-)_{SCM} + O_2^{\cdot -} + 2H^+ \longrightarrow OH^{\cdot} + OH^-$$

$$H_2O + (h_{VB}^+)_{SCM} \longrightarrow OH^{\cdot} + H^+$$

These reactions prevent the electron–hole pairs from recombining which reduces the efficiency of photocatalytic activity.

A sensitized photocatalytic process may be able to be operated in the presence of a coloured organic compound; in this case the adsorbed dye molecules are excited by visible light and thus act as photosensitizers. The excited dye molecule subsequently transfers electrons into the conduction band of the PANI homopolymer or the PANI/NiO, PANI/CoO nanocomposite, while the dye itself is converted to its cationic radical.

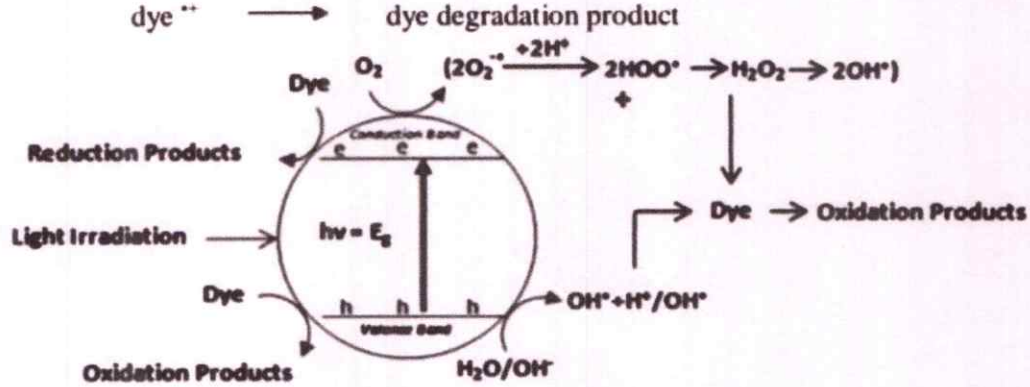
$$dye + hv \longrightarrow dye^*$$

$$dye^* + SCM \longrightarrow dye^{\cdot +} + (e_{CB}^-)_{SCM} \quad dye + (h_{VB}^+)_{SCM} \longrightarrow dye^{\cdot +}$$

These reactive species produced in the above manner can then react with the dye to form the degradation products and thus are responsible for the discoloration of MO, CV and CR dyes.

$$dye + \text{radical species } (O_2^{\cdot -}, OH^{\cdot})/\ H_2O_2 \longrightarrow \text{degradation product}$$

$$dye^{\cdot +} \longrightarrow \text{dye degradation product}$$



3.3 CoO,NiO,_CoO@Pani and NiO@Pani nanocomposites as Photocatalyst for dye degradation

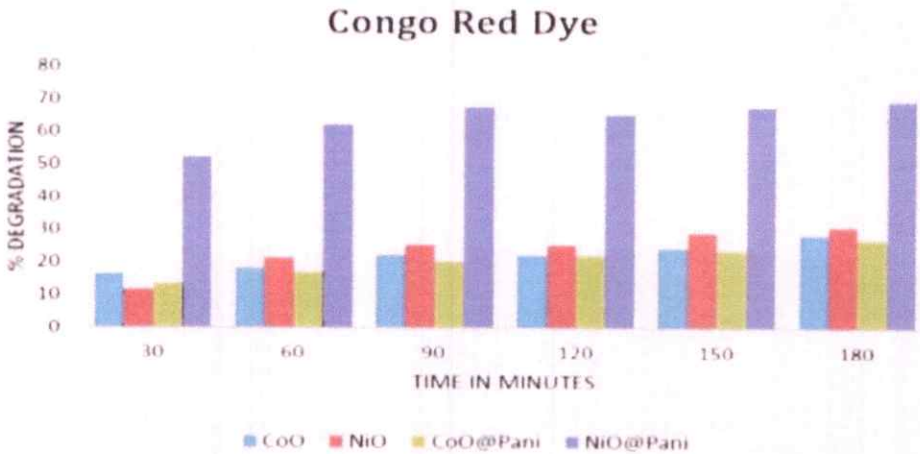


Figure 1: Use_CoO,NiO,_CoO@Pani and NiO@Pani nanocomposites as Photocatalyst For CR dye at pH 4 without H_2O_2

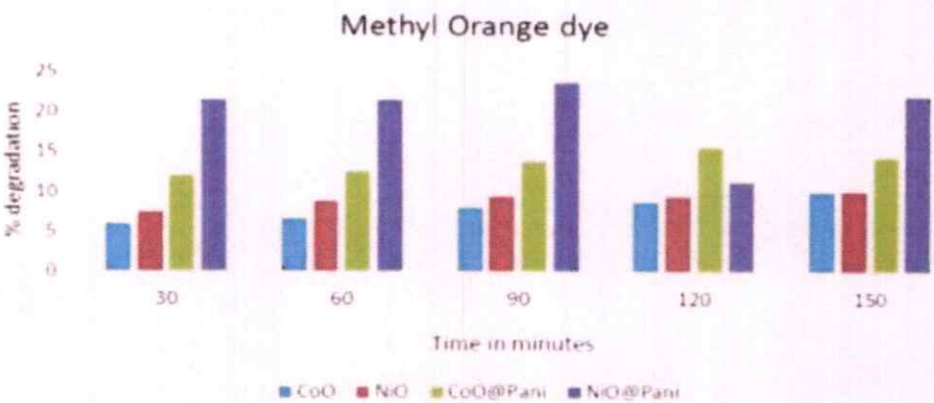


Figure 2: Use_CoO,NiO,_CoO@Pani and NiO@Pani nanocomposites as Photocatalyst For MO dye at pH 4, H_2O_2 8mM

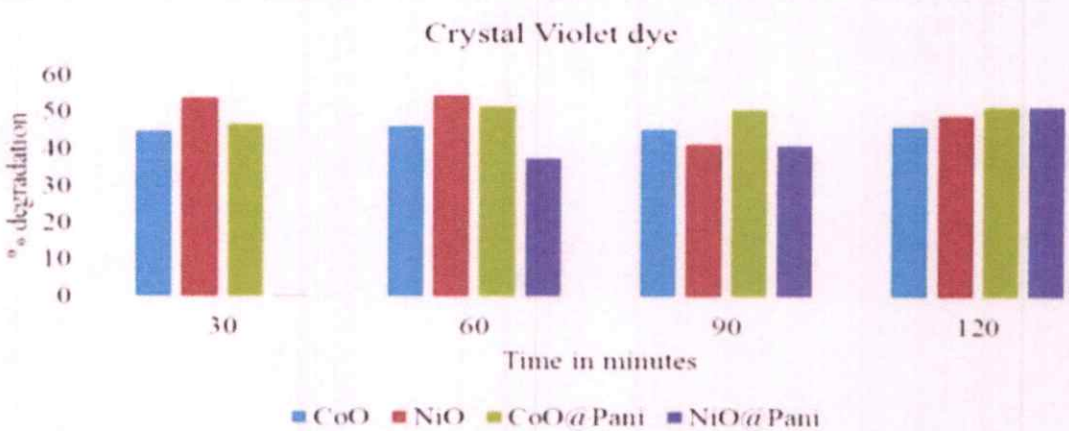


Figure 3: Use_CoO,NiO,_CoO@Pani and NiO@Pani nanocomposites as Photocatalyst For CR dye at pH 9, H_2O_2 8mM

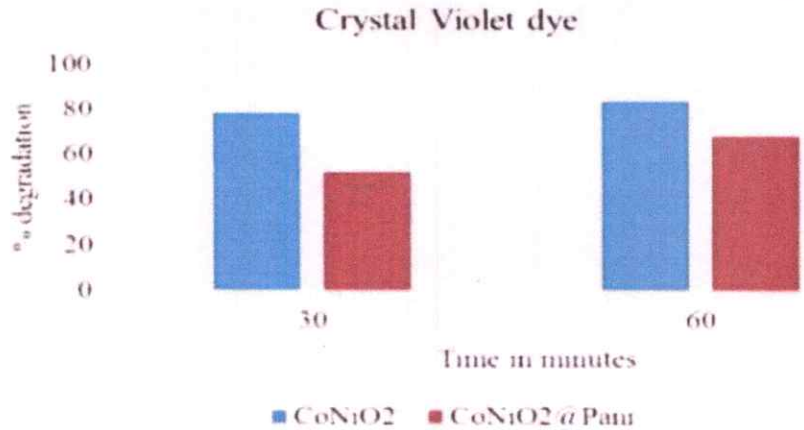


Figure 4: Use of $Co_x Ni_{(1-x)} O_2$ nanoparticles and $Co_x Ni_{(1-x)} O_2$ @ Pani nanocomposites as Photocatalyst for CV dye at pH 9 without H_2O_2.

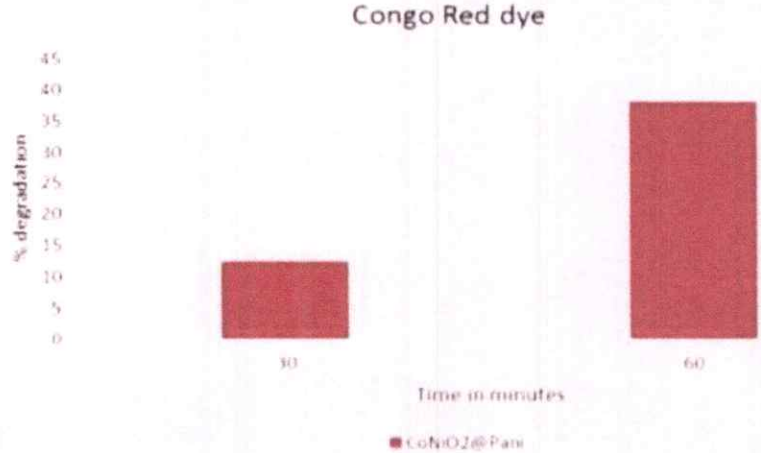


Figure 5: Use of $Co_x Ni_{(1-x)} O_2$ @ Pani nanocomposites as Photocatalyst for CR dye at pH 9 without H_2O_2

4. Conclusion

- NiO@Pani nanocomposite material is best catalyst for CR dye at pH 4 gives 70 % degradation in 3 hrs without using H_2O_2.
- NiO@Pani nanocomposites material is best catalyst for MO dye at pH 4, using H_2O_2 8mM.
- CoO@Pani and NiO@Pani nanocomposites are more efficient Photocatalyst for CV dye at pH 9, H_2O_2 8mM.
- $Co_x Ni_{(1-x)} O_2$ nanoparticles as binary metal oxide is more efficient Photocatalyst for CV dye at pH 9 without H_2O_2.
- Use of $Co_x Ni_{(1-x)} O_2$ @ Pani nanocomposites is better Photocatalyst for CR dye at pH 9 without H_2O_2.

5. References:

1. Vosoughifar, Photodegradation of dye in waste water using CaWO4/NiO nanocomposites; Co-precipitation preparation and characterization, J. Mater. Sci.- Mater. Electron. 29 (2018) 3194–3200.

2. N. Duraisamy, K. Kandiah, R. Rajendran, S. Prabhu, R. Ramesh, G. Dhanaraj, Electrochemical and photocatalytic investigation of nickel oxide for energy storage and wastewater treatment, Res. Chem. Intermed. 44 (2018) 5653–5667.
3. M. Qamar, M.A. Gondal, Z.H. Yamani, Synthesis of nanostructured NiO and its application in laser-induced photocatalytic reduction of Cr (VI) from water, J. Mol. Catal. A – Chem. 341 (2011) 83–88.
4. S.R. Dave Sushma, Use of Nanoparticles in Water Treatment: A review International Research Journal of Environment Science, 4 (2015) 103–106.
5. X. Cai, Y. Liu, H. Zeng, Y. Cai, H. Li, F. Zhang, Y. Wang, Synthesis and characterisation of alkali metal (Mn, Fe) oxide–ZnO nanorod composites and their photocatalytic decolourization of rhodamine B under visible light, Mater. Technol. 27 (2012) 380–387.
6. P.P. Hung, T.T. Dat, D.D. Dung, N.N. Trung, M.H. Hanh, D.N. Toan, L.H. Bac, Effect of annealing temperature on structural, optical and visible-light photocatalytic properties of NiTiO3 nanopowders, J. Electron. Mater. 47 (2018) 7301–7308.
7. B. Elahi, M. Mirzaee, M. Darroudi, R.K. Oskuee, K. Sadri, M.S. Amiri, Preparation of cerium oxide nanoparticles in Salvia Macrosiphon Boiss seeds extract and investigation of their photo-catalytic activities, Ceram. Int. (2018).
8. M.R. Esfahani, S.A. Aktij, Z. Dabaghian, M.D. Firouzjaei, A. Rahimpour, J. Eke, I.C. Escobar, M. Abolhassani, L.F. Greenlee, A.R. Esfahani, Nanocomposite membranes for water separation and purification: fabrication, modification, and applications, Sep. Purif. Technol. (2018).
9. X. Ren, P. Gao, X. Kong, R. Jiang, P. Yang, Y. Chen, Q. Chi, B. Li, NiO/Ni/TiO_2 nanocables with Schottky/pn heterojunctions and the improved photocatalytic activities.
10. Y.C. Sharma, V.S., V.K.S., S.N.K., C.H. Weng, Nano-adsorbents for the removal of metallic pollutants from water and wastewater, Environ. Technol. 330 (2009) 583–609.
11. The application of nanoparticles for wastewater remediation, Fut. Sci. (2013).
12. A.I. Uzaira Rafique, Abida K. Khan, Synthesis, characterization and application of nanomaterials for the removal of emerging pollutants from industrial waste water, kinetics and equilibrium model, J. Water Sustain. 2 (2012) 233–244.
13. M. Chakhoum, A. Boukhachem, M. Ghamnia, N. Benameur, N. Mahdhi, K. Raouadi, M. Amlouk, An attempt to study (111) oriented NiO-like TCO thin films in terms of structural, optical properties and photocatalysis.

Research on Chemical Intermediates
https://doi.org/10.1007/s11164-023-05213-1

Synthesis of 1, 8-dioxodecahydroacridines via Hantzsch condensation using theophylline in an aqueous medium: an eco-friendly and bio-based approach

Nilam S. Dhane[1] · Aboli C. Sapkal[2] · Suraj R. Attar[2] · Sanchita M. Dhumal[1] · Ganesh K. Chougule[1] · Samadhan P. Pawar[1] · Santosh B. Kamble[2] · Kishor V. Gaikwad[1]

Received: 4 November 2023 / Accepted: 18 December 2023

Abstract

In this work, we explored the convenient and sustainable method for the synthesis of 1, 8 dioxodecahydroacridine derivatives was achieved via a one-pot condensation reaction of dimedone, para-nitrobenzaldehyde, and ammonium acetate by using theophylline as a catalyst at room temperature in aqueous medium. This environmentally friendly method boasts several notable features, including high product yields, rapid completion of reactions, the use of eco-friendly and bio-based catalysts, straightforward work-up procedures without the need for column chromatography, cost-effectiveness, clean synthesis practices that avoid the use of harmful organic solvents, and exceptional atom efficiency.

Keywords Heterocycles · Eco-friendly and bio-based catalyst · 1, 8 Dioxodecahydroacridine · Aqueous medium

Introduction

The growing volumes of waste and the harmful residues that inevitably lead to chemical pollution need to be prevented from entering our environment. Consequently, synthetic chemists are driven to develop safer technologies that are

✉ Santosh B. Kamble
santoshsan1430@gmail.com
✉ Kishor V. Gaikwad
kishvgaikwad@rediffmail.com
Nilam S. Dhane
nilamdhane1990@gmail.com

1 Rajarshi Chhatrapati Shahu College, Kolhapur, India
2 Yashavantrao Chavan Institute of Science, Satara, Lead College of Karmaveer Bhaurao Patil University, Satara, India

J. Korean Soc. Math. Educ. Ser. B: Pure Appl. Math.
https://doi.org/10.7468/jksmeb.2024.31.2.179
Volume 31, Number 2 (May 2024), Pages 179–187

ISSN(Print) 1226-0657
ISSN(Online) 2287-6081

CURVELET TRANSFORM AS AN EXTENSION OF WAVELET TRANSFORM AND ITS OPERATIONAL CALCULUS

SACHIN MANE [a,*], BHARAT BHOSALE [b] AND SHUBHAM D. SHEDGE [c]

ABSTRACT. In image and signal processing, the wavelet transform is frequently employed. However, it has the drawback of having weak directionality, which has limited its use in many applications. A recent addition to the wavelet transform, the curvelet transform attempts to address crossing phenomena that occur along curved edges in 2-D images.

As an extension of the wavelet transform, we discuss various curvelet transform features in this paper. There are numerous uses for the curvelet and wavelet transforms in image and signal processing.

1. INTRODUCTION

A multi-scale geometric analysis tool for images is the wavelet transform. Its uses in the field of image denoising are numerous, and the advantage of the wavelet transform is that it can reflect one-dimensional continuous signal singularity while preserving the singularity of the edge of two-dimensional images, such as a variety of straight lines, curves, etc. In a higher-dimensional plane, it is difficult to use the wavelet transform to express its features [10]. Wavelet analysis is useful for modelling acoustic scattering and sonar [6]. The curvelet transform, a new multi-scale representation suitable for objects that smooth away discontinuities across curves, was introduced by Candes and Donoho (1999) [7]. Wavelet-based multi-resolution approaches have close ties to optical data analysis, biological and computer vision, image and signal processing, and scientific computing. Wavelet functions are used as the object in multi-resolution analysis to specify the signal as a collection of its successive approximations[1]. Wavelets use the multi-resolution technique, which is deeply related to signal processing [2]. Ridgelets are specially adapted only to

Received by the editors September 30, 2023. Revised December 1, 2023. Accepted Dec. 20, 2023.
2020 *Mathematics Subject Classification.* 44A05.
Key words and phrases. wavelet transform, curvelet transform, extended curvelet transform.
*Corresponding author.

4. B. Bhosale, A. Jain & et.al.: Curvelet based multiresolution analysis of graph neural networks. International Journal of Applied Physics and Mathematics **4** (2014), no. 5, 313-316. https://doi.org/10.7763/IJAPM.2014.V4.304
5. E.J. Candès & D.L. Donoho: Ridgelets: A key to higher-dimensional intermittency. Philosophical Transactions of the Royal Society of London. Series A: Mathematical, Physical and Engineering Sciences **357** (1999), no. 1760, 2495-2509. https://doi.org/10.1098/rsta.1999.0444
6. L. Debnath & Shah, F.A. : Wavelet transforms and their applications. Boston: Birkhäuser (2002), 12-14. https://doi.org/10.1007/978-0-8176-8418-1
7. D.L. Donoho & M.R. Duncan: Digital curvelet transform: strategy, implementation, and experiments. In Wavelet applications VII SPIE **4056** (2000), 12-30. https://doi.org/10.1117/12.381679
8. J. Ma & G. Plonka: A review of curvelets and recent applications. IEEE Signal Processing Magazine **27** (2000), no. 2, 118-133.
9. S.D. Shedge & B.N. Bhosale: Operational Calculus On Wavelet Transform As An Extension Of Fractional Fourier Transform. Journal of the Oriental Institute M.S. University of Baroda **71** (2022), 56-59.
10. J.S. Walker & Y. Chen: Image denoising using tree-based wavelet subband correlations and shrinkage. Optical Engineering **39** (2000), no. 11, 2900-2908. https://doi.org/10.1117/1.1315571

[a]Research Scholar: Department of Mathematics.Shivaji University Kolhapur, Maharashtra, India.
Email address: sachinm3116@gmail.com

[b]Principal. Prof.: Sambhajirao Kadam College. Deur. Satara, Maharashtra. India
Email address: bnbhosale15@gmail.com

[c]Professor: Department of Mathematics, Rajarshi Chhatrapati Shahu College, Kolhapur, Maharashtra, India
Email address: shedge.shubham@rcsc.ac.in

Journal of the Maharaja Sayajirao University of Baroda
ISSN :0025-0422

EFFECT OF MEDIA ON ISOLATES COLLETOTRICHUM GLOEOSPORIOIDES CAUSING ANTHRACNOSE DISEASE OF CUSTARD APPLE (ANNONA SQUAMOSA)

V.B.Chopade. Department of Botany, Sadguru Gadage Maharaj College, Karad
S.D.Shaikh Rajarshi Chhatrapati Shahu College, Kolhapur

Abstract: Maharashtra is the major producer of Custard apple in the country. Custard apple plant having various economic important but it get infected due to the various fungal and bacterial diseases. Large scale infection of Anthracnose disease caused due to Colletotrichum gloeosporioides has resulted in considerable damage to the crop from many years. Economic losses are reported during postharvest where the disease incidence and severity was recorded as 22-40 % and 85-98 % respectively. The studies on the effect of media on isolates of anthracnose disease of Custard Apple caused by Colletotrichum gloeosporioides will help in the management of the disease.

Keywords: Media, Anthracnose disease, Custard apple, Colletotrichum gloeosporioides

Introduction: Colletotrichum sp. was renowned as a causal agent for anthracnose disease of Custard apple. It was the main problem of Custard apple fruit in the field or post-harvest. The disease will downgrade the quality and value of the fruits makes farmers lost their profit. Colletotrichum gloeosporioides is the causal agent for this disease. There are also cases where anthracnose disease in a crop is caused by several Colletotrichum species such as C. acutatum, C. fragariae, C. gloeosporioides which was the causal agent for strawberry anthracnose (Smith and Black, 1990). Association of several Colletotrichum spp. may also cause different diseases other than anthracnose. For example, ripe rot of grape was caused by association of C. acutatum and C. gloeosporioides. Colletotrichum gloeosporioides is well-known as a causal agent for anthracnose disease in most of fruits in the tropics such as custard apple papaya, mango, guava and capsicum while banana is caused by C. musae (Smith and Black, 1990).

The pathogen produced lesions on leaves, fruit and other parts of plant. Finally these lesions become dark. Infection starts at blossom's end of the fruit and later infection spreads on entire fruit surface. Affected fruits sometimes shrivel and may cling to the tree or sometimes fall down. Necrotic spots of 2-12 mm in diameter appear on unripe fruits which turn into dark brown to black spots. These spots coalesce later and cover entire fruit. So fruit become blackish. Most significant economic losses are reported occur during post-harvest (Freeman et al., 1998). Geographically, the climate of India is highly conducive to maintain and cause outbreaks of anthracnose all year round, thus, the development of management recommendations will be inevitable for anthracnose control (Mahmodi et al., 2013). The objectives of the study were to identify the good media for fungi growth.

MATERIAL AND METHODS

Sampling of Anthracnose Fungi: Causal agent of anthracnose disease, Colletotrichum sp. was isolated from lesions of infected Custard Apple (Annona squamosa) from orchard as well as supermarket in Vita, Ramanandnagar, Atapadi (Sangli), Pakani, Barshi, Akluj (Solapur), Kagal, Malkapur, Ghunaki (Kolhapur), Satara, Patan, Koregaon (Satara) Maharashtra, India. The infected fruits were taken to the laboratory in clean, sterilized polythene bags and isolated using the protocol as outlined by Cai et al., (2009).

Pathogen Isolation:Infected part of fruit was cut into small pieces of 1cm to 2 cm along with some healthy tissue. Then soaked into 10% sodium hypochlorite for 30 sec, 70% ethanol for 30 – 60s and washed with distilled water for 60s. Dried with sterile filter paper and immediately placed on PDA (Ng et al., 2011; Hailmi et al., 2011). Mix colonies of fungi isolates were then re-isolated to obtain pure culture for each plate. Plates were incubated at 28°C in incubator. The observation on colony morphology was done by naked eyes andmycelium and conidia were viewed under light microscope.

Test of media on fungi: Potato Dextrose Agar (PDA) and Difco's Nutrient Agar (NA) were prepared. Then 0.5-cm fungal disc was taken from 7 days old culture and transferred to the center of all media. The cultured media was incubated for 7 days at 28°C. There are four replicates for each treatment.

Traditional fishing gears and fishing practices from Radhanagari Tehsil Kolhapur District, Maharashtra

Vishwajeet Lagade[1], Santhos Madhale[2], Atul Kamble[3], Prakash Pawar[4] and Swapnaja Lagade[5]

[1]Department of Zoology, Shri Yashwantrao Patil Science College Solankur, Kolhapur, Maharashtra 416212.

[2]Department of Botany, Shri Yashwantrao Patil Science College Solankur, Kolhapur, Maharashtra 416212

[3,4]Department of Chemistry, Shri Yashwantrao Patil Science College Solankur, Kolhapur, Maharashtra 416212

[5]Department of Zoology, Rajarshi Chhatrapati Shahu College, Kolhapur 416003

Corresponding author E-mail: drvmlagade@gmail.com

Abstract

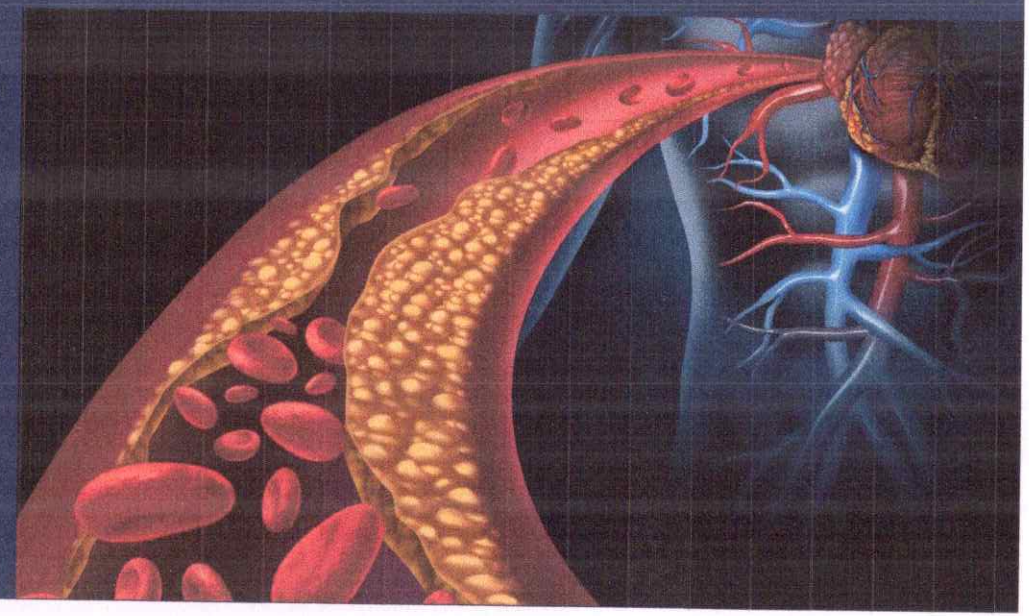
Throughout the world, freshwater fishes are exploited on a large scale for flesh and revenue. In the present work, we have highlighted the various indigenous fishing techniques performed by fishers to catch freshwater fish from Radhanagari Tehsil, Kolhapur District Maharashtra. The Radhanagari tehsil is well known for both lotic (Dudhganga River, Bhogawati River and Tulshi River) and lentic (Dudhsagar dam, Radhanagari dam, Tulshi dam) freshwater resources. The local fishers of Radhanagari tehsil were actively engaged in freshwater fishing. In this study, information was collected from the fishermen by both primary and secondary sources. The fishers belong to Khatik, Bhoi and Muslim communities and they are traditionally depending upon freshwater resources for their subsistence. These all communities were applying traditional based methods for fishing the freshwater fish. Fishers used various traditional gears and other devices for fishing purposes, the fishing gears comprising gill nets, cast nets, dol nets, traps of bamboo baskets, spears, hooks and lines etc. Since ancient times, these fishing gears or devices were used by fishers for commercial and domestic fishing purposes. This traditional-based fishing technique will help in the sustainable exploitation of fish resources without harming the natural ecosystem. Therefore, indigenous knowledge should be maintained and preserved as seek of ecological sustainability and health perspective.

Keywords: Indigenous fishing techniques, Fishing gears, fisher community and Radhanagari tehsil.

Introduction

Radhanagari forest is one of the hot spots for biological diversity and it has been declared a natural World Heritage Site by UNESCO since 2012. Radhangari is located in the southern region of the green Sahyadri valleys of the Western Ghats and it is ideal for vulnerable and delicate biodiversity sites in the world (Sangale, 2022). The Radhanagari tehsil is well known for both lotic (Dudhganga River, Bhogawati River and Tulshi River) and lentic (Dudhsagar Dam, Radhanagari Dam, Tulshi Dam) freshwater habitats. The aquatic habitats are indicates the ecological health and wealth of Radhanagari. Since old age, these aquatic resources are actively harvested by living communities for their bread and better purpose. All rural and urban communities primarily rely on the fisheries and aquaculture sector for their income, food,

The Book on atherosclerosis delve into a comprehensive understanding of this stealthy arterial disease. It explore the intricate interplay of cholesterol, inflammation, oxidative stress, and endothelial dysfunction in plaque formation. It emphasize the significance of risk factors, such as diet, smoking, hypertension, and genetics. These texts shed light on clinical aspects, helping healthcare professionals diagnose and treat atherosclerosis-related conditions. They cover the signs, symptoms, and diagnostic tools used to detect the disease,with advanced imaging techniques.It play pivotal role of lifestyle modifications like dietary changes, exercise, and smoking cessation in reducing the risk of atherosclerosis.They cover medications, including statins and antiplatelet agents, as well as surgical interventions .The latest research findings and emerging therapies are also discussed in these books .In summary, books on atherosclerosis encompass a wide spectrum of knowledge, from its molecular origins to clinical management. They serve as invaluable resources for healthcare professionals, researchers and individuals seeking to understand and combat this insidious arterial threat.



Pravina Piste, Ph.D.,Heterocyclic Chemistry from Shivaji University, Kolhapur, Professor at Rajarshi Chhatrapati Shahu College, Kolhapur. She has a remarkable track record with numerous high-impact international research papers and has supervised six Ph.D. students.Contributes to academia as a referee and associate editor at the international level

9 786206 783695

Pravina B. Piste

Understanding Atherosclerosis: The Silent Threat to Arterial Health

Atherosclerosis Insights

LAP LAMBERT Academic Publishing

B.Aadhar International Peer-Reviewed Indexed Research Journal

Impact Factor -(SJIF) –8.632, Issue NO, (CDLXIII) 463

ISSN : 2278-9308

March, 2024

Unmasking the Shadows: Understanding and Preventing Digital Fraud in UPI Banking Transactions.

Shivani j Patil [1] Dr. Smt.M.B.Desai[2]

1.Research Fellow, Department of Economics, Shivaji University Kolhapur

2.Professor, Dept. of Economics, R. C. Shahu College, Kolhapur

Abstract:

The introduction of the Unified Payments Interface (UPI) in India has led to an increase in digital fraud, including traditional methods like phishing, social engineering, and SIM swapping. The article underlines the need to maintain user alertness, protect UPI PINs and OTPs, and implement security processes. It emphasizes the duties of banks and governments in maintaining a safe digital payment environment. Banks should strengthen their security measures, educate their consumers, and provide effective dispute-resolution systems. The Reserve Bank of India plays an important role in establishing rules and safeguarding consumers.

Introduction

In recent years, the rise of digital banking and payment methods has revolutionized the way we handle our financial transactions. One such method that has gained immense popularity in India is the Unified Payment Interface (UPI) system. It is a real-time payment system that allows users to transfer funds between bank accounts using a mobile application. With its ease of use and convenience, UPI has become the go-to choice for millions of people in India. However, this rapid growth has also attracted the attention of fraudsters, who are constantly finding new ways to exploit vulnerabilities in the system. In this paper, we will explore the world of digital fraud in UPI banking transactions, understand its causes, and discuss preventive measures to safeguard against it.

UPI (Unified Payments Interface) is a popular digital payment method in India, but it is becoming increasingly susceptible to fraudulent activities. To prevent UPI scams, avoid sharing your PIN or OTP with anyone, verify recipient details before sending money, use a strong PIN, avoid public Wi-Fi, keep your phone and UPI app updated, and report suspicious activity to your bank. Be cautious of unsolicited calls, download apps from untrusted sources, monitor transaction history, and set daily transaction limits. To protect UPI transactions, use a strong PIN, enable multi-factor authentication, use a screen lock, avoid public Wi-Fi, and regularly update your operating system. Stay alert for suspicious activity and verify information before sending money. If scammed, contact your bank, create a new strong PIN, or report the fraudulent activity to the National Payments Corporation of India (NPCI).

Review of literature:

This document provides an overview of recent cybercrime incidents and arrests in India, including the Chandigarh Police busting a Jamtara gang, information about a chartered accountant's loss to fraudsters, Google's AI cybersecurity tools, and the arrest of a Chennai woman who gave away bank accounts to online fraudsters. It promotes government programs including a National Cybercrime Reporting Portal and a National Helpline number, as well as citizen vigilance and prompt reporting.(cyber digest).Tthe report covers the expansion of digital payments in India, as well as the rising fraud concerns that accompany them. It exposes the weaknesses that fraudsters exploit in emerging payment systems, such as hacking and phishing attempts. Identity theft, phishing, online skimming, and social engineering are all common types of fraud. The document underlines the need of establishing fraud risk management procedures in order to save operating costs, protect reputation, and retain consumers. It suggests strategies such as fraud orchestration, consumer awareness, fraud governance framework, simulation testing, analytics, and real-time monitoring. (PwC).The document investigates COVID-19's impact on digital payments in India, focusing on the shift in consumer behavior toward online transactions. According to an NPCI and PRICE poll, digital payment adoption is growing across all socioeconomic categories, with a significant number of households using these methods. There is a mismatch between smartphone owners and digital payment users that must be addressed via education, particularly in online banking. The study underlines the banking sector's strong digital connection with clients, particularly those in low-income households, as well as the success of the Direct Benefit Transfer (DBT) distribution system. Overall, the statement emphasizes the trend toward digital payments in India and the need of empowering customers while also enhancing the safety and efficiency of online

Stronger Self-focusing of Gaussian Laser Beam in Collisionless Plasma Based Exponential Density Profile

K. Y. Khandale[1,2], A. T. Valkunde[3](✉), S. S. Patil[4], P. T. Takale[1], R. T. Patil[2], A. S. Patil[2], S. D. Patil[4], and M. V. Takale[1](✉)

[1] Department of Physics, Shivaji University, Kolhapur, Maharashtra 416004, India
mvtphyunishivaji@gmail.com

[2] Rajarshi Chhatrapati Shahu College, Kolhapur, Maharashtra 416004, India

[3] Department of Physics, Government Polytechnic, Khamgaon, Buldhana 444312, India
atvalkunde@gmail.com

[4] Department of Physics, Devchand College, Arjunnagar, Kolhapur 591 237, India

Abstract. The nonlinear features of intense Gaussian laser beams traversing through collisionless plasma along with tangent upward density ramp as well as exponential density profile have been investigated theoretically in the current paper. Naturally, the ponderomotive force is primarily responsible for the collisionless plasma's nonlinear dielectric function. The differential equations for the beam width parameter (BWP) f have been constructed and numerically solved using Akhmanov's parabolic wave equation approach via paraxial and Wentzel-Kramers-Brillouin (WKB) approximations. By utilizing the fourth-order Runge–Kutta method the numerical computation is completed. The noteworthy impact of exponential density profile on propagation dynamics of a Gaussian laser beam is precisely explored and correlated with tangent upward density ramp profile. It is revealed that an exponential density ramp, rather than a tangent upward density ramp, leads the laser beams to become highly focused.

Keywords: Density ramp · Self-focusing · Plasma · Gaussian · Wentzel-Kramers-Brillouin approximation

1 Introduction

Neutral and charged particles combine to form the quasineutral gas known as plasma, which displays collective performance. Self-focusing is a fundamental, 3rd order, and fascinating nonlinear optical phenomenon in which an intense laser beam impacted on a medium modifies the optical characteristics so that the beam comes to focus within the medium. The three key mechanisms that aid to changes in the dielectric function of the plasma in the study of laser-plasma interactions: (i) collisional, (ii) ponderomotive force, and (iii) relativistic. The optical indemnity generated in solids by high-power laser beams is frequently caused by self-focusing [1, 2]. In addition to being of technological interest, the interaction of ultra-high-power laser beam with plasmas is also enriched

A. Saha and S. Banerjee (Eds.): ICNDA 2024, SPPHY 405, pp. 420–430, 2024.
https://doi.org/10.1007/978-3-031-66874-6_33

Construction of Curvelet Transform as an Extension of Wavelet Transform

Sachin L. Mane,[1, a)] Bharat N. Bhosale,[2, b)] and Shubham D. Shedge[3, c)]

[1]*Department of Mathematics, Shivaji University, Kolhapur, Maharashtra 416004, India*
[2]*Prof. Sambhajirao Kadam College, Deur, Satara, Maharashtra 415524, India*
[3]*Department of Mathematics, Rajarshi Chhatrapati Shahu College, Kolhapur, Maharashtra 416005, India*

[a)]Corresponding author: sachinm3116@gmail.com
[b)]bnbhosale15@gmail.com
[c)]shedge.shubham@rcsc.ac.in

Abstract. Curvelet Transform typically offers significantly superior performance in image analysis, multi-resolution and multidirectional representation as compared to Wavelet Transform. This paper exploites strong relationship between Wavelet Transform and Curvelet Transform. Also we use mother Wavelet to construct Curvelet Transform as an extension of Wavelet Transform which has broad implications, particularly for the field of signal and image processing.

INTRODUCTION

Signal and image processing, biological and computer vision, scientific computing, and optical data analysis have all extensively employed wavelet-based multi-resolution techniques [1]. Olshausen and Field's work in Nature [2], The similarities between multi-scale image processing and vision have been discussed by researchers studying biological vision. Wavelet transform as an extension of fractional Fourier transform is useful to solve ordinary differential equations and partial differential equations like heat equation, schrodinger's equation [3]. However, a limitation of wavelets is their direction selectivity, which is a crucial response characteristic for simple cells and neurons at different points along the visual pathway. Recent years have seen significant progress with the development of directional wavelets, surpassing several earlier attempts. Modeling and analyzing traffic networks is just one of the many useful applications of network analysis [4].

Candes and Donoho proposed an anisotropic geometric curvelet transform in1999. Later, Candes and Donoho proposed a much simpler second generation curvelet transform based on a frequency partition technique [5]. In image processing, digital images are represented as two-dimensional matrices. To obtain clear features in images, one crucial task is to modify the values of these matrices [6]. Currently, the second-generation curvelet transform finds extensive application across various fields, including fluid mechanics, seismic data exploration, signal and image processing, and solution of partial differential equations arising in nonlinear physical phenomena. Curvelet functions represent functions which have discontinuities along straight lines where wavelet functions are not properly worked [7]. The curvelet transform is a recent development used in signal and image processing applications. This study systematically transitions from classical wavelets to curvelets. So we are finding an extended curvelet transform via wavelet transform.

THE CLASSICAL WAVELET TRANSFORM

Wavelets are mathematical functions that perform scale or resolution-based data analysis. When analysing a signal across different windows or resolutions, wavelets prove useful. In practice, a wavelet transform involves convolving the signal with a set of functions derived from shifts and dilations of a fundamental wavelet. In exact words and notation the classical wavelet transform, also known as the Continuous Wavelet transform (CWT), is a decomposition of a function, f(x), with respect to a basic wavelet, $\psi(x)$, represented by the convolution of a function with a scaled

Recent Trends in Mathematics, Statistics, and Engineering
AIP Conf. Proc. 3242, 020013-1–020013-8; https://doi.org/10.1063/5.0234281
Published under an exclusive license by AIP Publishing. 978-0-7354-5038-7 $30.00

About the Authors

Prof. (Dr.) DNYANDEV N. ZAMBARE
M.Sc., Ph.D.
Vice Principal, Professor and Head, P.G. Recognized Teacher, Research Guide,
Department of Chemistry, Kisan Veer Mahavidyalaya, Wai

Dr. AVINASH M. NALAWADE
M.Sc., M.Phil., Ph.D.
Associate Professor, PG Recognized Teacher, Research Guide,
Lal Bahadur Shastri College, Satara

Prof. (Dr.) REKHA A. NALAWADE
M.Sc., Ph.D.
Professor, P.G. Recognized Teacher, Research Guide, Department of Chemistry,
Lal Bahadur Shastri College, Satara

Prof. (Dr.) PRAVINA B. PISTE
M.Sc., M.Phil, Ph.D.
Professor and Head, Department of Chemistry, PG and Ph.D. Recognized Teacher,
Rajarshi Chhatrapati Shahu College, Kolhapur

Prof. (Dr.) ARJUN S. KUMBHAR
M.Sc, Ph.D.
Professor, DST-SERB Young Scientist
Department of Chemistry, Vivekanand College, Kolhapur (Autonomous)

BOOKS AVAILABLE AT

PUNE : NIRALI PRAKASHAN	: Sur. No. 28/27, Dhayari-Katraj Road, Near Pari Company, Dhayari, Pune - 411 041. Ph. (020) 24690204 • Fax: (020) 24690316 Email: bookorder@pragationline.com
KOLHAPUR : Nirali Prakashan	: 438/2, Bhosale Plaza, Shop. No. 3, Khasbag, Opp.Balgopal Talim, Kolhapur. Mob. 9850046155 • Email : kolhapur@niralibooks.com
Mehta Book Sellers	: Bhausingji Road, Kolhapur. Tel. (0231) 2541881
Nokari Sandharbh Book Shopee	: Opp. S.T. Stand, Kolhapur. Tel. 9823377227
Best Book Suppliers	: Tal. Uchgaon, Dist. Kolhapur. Tel. 9860780143
Granth The Book World	: Rajarampuri, 5th Lane, Kolhapur. Tel.(0231) 2535 355
Titus Book Depot	: Rajarampuri, 1st Lane, Kolhapur. Tel.(0231) 2522 546
SANGLI : Nirali Prakashan	: Haripur Road, nandrekar Plot, Sangli. Mob. 9921516852
G. R. Tamhankar Book Sellers	: Saraf Naka, Sangli. Tel. (0233) 2329966
Sankapal Book Stall	: Kapad Peth, Near Church, Sangli. Tel. (0233) 2326447
MIRAJ : Ratnakar Book Stall	: Deval Talkies, Miraj. Tel. (0233) 2222564
SATARA : Alankar Book Stall	: Opp. Science College, Satara. Tel. (02162) 220456

Email: niralipune@pragationline.com
Website: www.pragationline.com

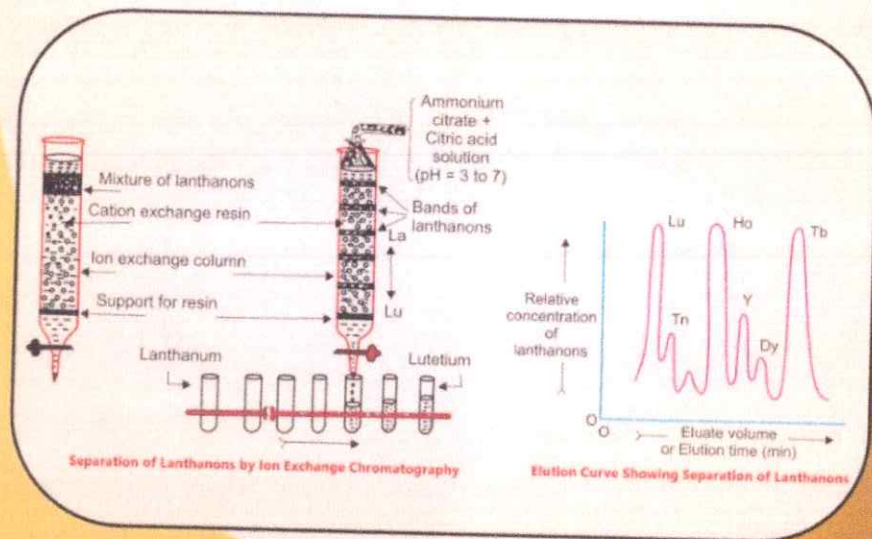
Also find us on www.facebook.com/niralibooks
@nirali.prakashan

As Per New Syllabus (CBCS Pattern and NEP 2020)
Shivaji University, Kolhapur
B.Sc. Part-II : Semester-IV

INORGANIC CHEMISTRY

CHEMISTRY (DSC-D3) : PAPER-VII

Prof. (Dr.) DNYANDEV N. ZAMBARE Dr. AVINASH M. NALAWADE
Prof. (Dr.) REKHA A. NALAWADE Prof. (Dr.) PRAVINA B. PISTE
Prof. (Dr.) ARJUN S. KUMBHAR



Separation of Lanthanons by Ion Exchange Chromatography

Elution Curve Showing Separation of Lanthanons

NIRALI PRAKASHAN
ADVANCEMENT OF KNOWLEDGE

About the Authors

Prof. (Dr.) PRAVINA B. PISTE
M.Sc., M.Phil, Ph.D.
Professor and Head, Department of Chemistry, PG and Ph.D. Recognized Teacher,
Rajarshi Chhatrapati Shahu College, Kolhapur

Prof. (Dr.) ARJUN S. KUMBHAR
M.Sc, Ph.D.
Professor, DST-SERB Young Scientist
Department of Chemistry, Vivekanand College, Kolhapur (Autonomous)

Prof. (Dr.) DNYANDEV N. ZAMBARE
M.Sc., Ph.D.
Vice Principal, Professor and Head, P.G. Recognized Teacher, Research Guide,
Department of Chemistry, Kisan Veer Mahavidyalaya, Wai

Dr. AVINASH M. NALAWADE
M.Sc., M.Phil., Ph.D.
Associate Professor, PG Recognized Teacher, Research Guide,
Lal Bahadur Shastri College, Satara

Prof. (Dr.) REKHA A. NALAWADE
M.Sc., Ph.D.
Professor, P.G. Recognized Teacher, Research Guide, Department of Chemistry,
Lal Bahadur Shastri College, Satara

BOOKS AVAILABLE AT

PUNE : NIRALI PRAKASHAN	: Sur. No. 28/27, Dhayari-Katraj Road, Near Pari Company, Dhayari, Pune - 411 041. Ph. (020) 24690204 • Fax: (020) 24690316 Email: bookorder@pragationline.com
KOLHAPUR : Nirali Prakashan	: 438/2, Bhosale Plaza, Shop. No. 3, Khasbag, Opp.Balgopal Talim, Kolhapur. Mob. 9850046155 • Email : kolhapur@niralibooks.com
Mehta Book Sellers	: Bhausingji Road, Kolhapur. Tel. (0231) 2541881
Nokari Sandharbh Book Shopee	: Opp. S.T. Stand, Kolhapur. Tel. 9823377227
Best Book Suppliers	: Tal. Uchgaon, Dist. Kolhapur. Tel. 9860780143
Granth The Book World	: Rajarampuri, 5th Lane, Kolhapur. Tel.(0231) 2535 355
Titus Book Depot	: Rajarampuri, 1st Lane, Kolhapur. Tel.(0231) 2522 546
SANGLI : Nirali Prakashan	: Haripur Road, nandrekar Plot, Sangli. Mob. 9921516852
G. R. Tamhankar Book Sellers	: Saraf Naka, Sangli. Tel. (0233) 2329966
Sankapal Book Stall	: Kapad Peth, Near Church, Sangli. Tel. (0233) 2326447
MIRAJ : Ratnakar Book Stall	: Deval Talkies, Miraj. Tel. (0233) 2222564
SATARA : Alankar Book Stall	: Opp. Science College, Satara. Tel. (02162) 220456

Email: niralipune@pragationline.com
Website: www.pragationline.com

Also find us on www.facebook.com/niralibooks
@nirali.prakashan

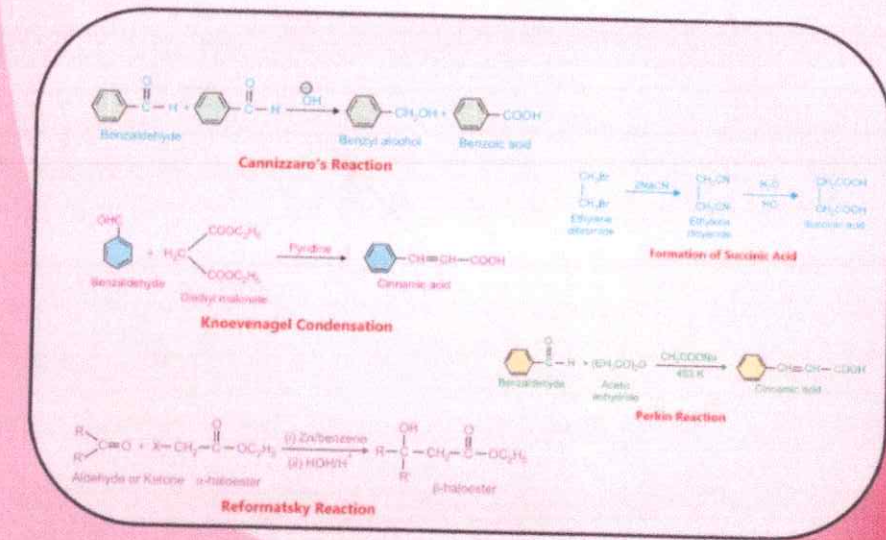
N7434

As Per New Syllabus (CBCS Pattern and NEP 2020)
Shivaji University, Kolhapur
B.Sc. Part-II : Semester-IV

ORGANIC CHEMISTRY

CHEMISTRY (DSC-D4) : PAPER-VIII

Prof. (Dr.) PRAVINA B. PISTE
Prof. (Dr.) ARJUN S. KUMBHAR
Prof. (Dr.) DNYANDEV N. ZAMBARE
Dr. AVINASH M. NALAWADE
Prof. (Dr.) REKHA A. NALAWADE



NIRALI PRAKASHAN
ADVANCEMENT OF KNOWLEDGE