



**B.M.S COLLEGE OF ENGINEERING, BENGALURU-19**  
**Autonomous Institute, Affiliated to VTU**  
**Department of Physics**

**AY 2020-21 (1st of July 2020- 31<sup>st</sup> of June 2021)**

**June 30<sup>th</sup>, 2020: Mrs. Poojitha C.G,** Research scholar, Dept. of Physics participated in the India's first virtual Science Leadership Workshop organised by Science Academies'-IN-YAS Central University of Punjab Bathinda (CUPB).



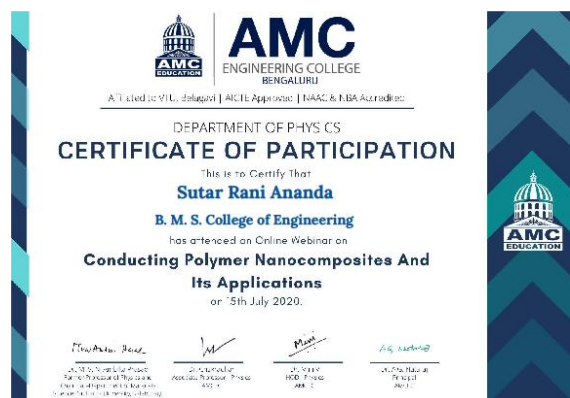
**June 22<sup>nd</sup> to July 04<sup>th</sup>, 2020: Mrs. Poojitha C.G,** Research scholar, Dept. of Physics participated online Faculty Development Programme (FDP) on Python organised by Spoken Tutorial, IIT Bombay Remote Faculty Development Programme (FDP) and Dept. Of ECE, JSS Academy of Technical Education, Noida Uttar Pradesh.



**July 01<sup>st</sup>- 04<sup>th</sup>, 2020:Mrs. Poojitha C.G,** Research scholar, Dept. of Physics participated in the International Webinar on "New Research Trends in Functional Physics (NRTFP-2020)" organised by Dept. Of Physics, AKS University, Satna, Madhya Pradesh.



**July 15<sup>th</sup>, 2020:** Mrs. Sutar Rani Ananda, Research scholar, Dept. of Physics participated in the Online Webinar on "Conducting Polymer Nanocomposites and its Applications" organised by Dept. Of Physics, AMC Engineering College, Bangalore.



**July 22<sup>nd</sup>, 2020:** Mrs. Sutar Rani Ananda, Research scholar, Dept. of Physics participated in the one day online national conference on "Emerging Trends in Physical Sciences NCETPS-2020" organised by Dept. of Physics, Arts, Science and Commerce College Ramanandnagar (Burli) - Sangli, Maharashtra.



**July 13<sup>th</sup>-14<sup>th</sup>, 2020:** Mr. Sumantha H.S, R Research scholar, Dept. of Physics participated in the Webinar Series on "Industrial application on Electrochemistry". Organized by Department of Chemistry, P.E.S. Institute of Technology and Management, NH 206, Sagar Road, Shivamogga, Karnataka -577204.



**July 14<sup>th</sup> 2020:** Dr. Latakumari, Assistant Professor, Mr. Sumantha H.S, Mrs. Poojitha C.G, Nisha P.G Research scholars, Dept. of Physics participated “How to Choose Right Journal” conducted by the B.M.S.C.E Research and development centre, Jointly Organized by IEEE Bangalore Section,



**July 13<sup>th</sup>-17<sup>th</sup>, 2020:** Mr. Sumantha H.S, Research scholars Dept. of Physics participated five days webinar on “Exploring ICT Activities in Higher Education” conducted by The National College Jayanagar, Bangalore-560070.

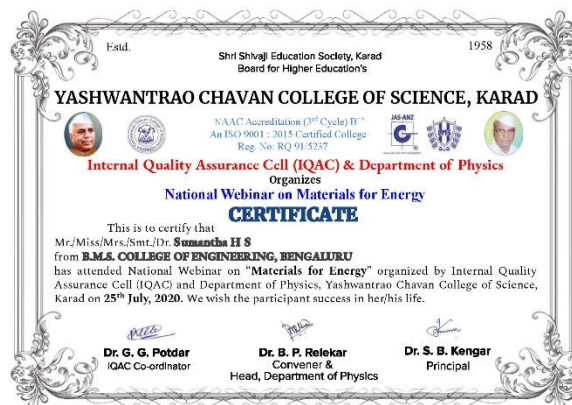


**July 20<sup>th</sup>, 2020:** Mr. Sumantha H.S, Research scholar, Dept. of Physics participated in School of Civil Engineering, Reva University Bengaluru- 560064 webinar on “How to Write Effective



Research paper”.

**July 25<sup>th</sup>, 2020:** Mr. Sumantha H.S, Research scholar, Dept. of Physics participated in the “Materials for Energy”, Organized by IQAC and Department of physics, Yashwantrao Chavan College of Science Karad, Vidyanagar, Maharashtra -415124.



**July 21<sup>th</sup>, 2020:** Mrs. Nisha P.G, Research scholar, Dept. of Physics participated in the MoES Webinar Series-21st Live Talk by **Dr. M. Ravichandran, Director, NCPOR, Goa**, on the Topic: **: Indian Arctic Program**

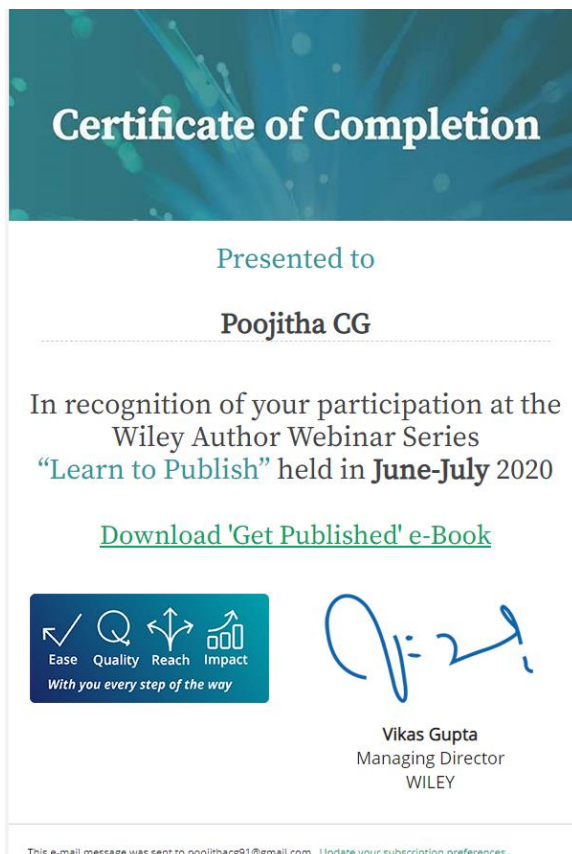


**July 27<sup>th</sup>-31<sup>st</sup>, 2020:** Mrs. Nisha P.G, Mrs. Poojitha C.G Research scholars, Dept. of Physics participated in the International Symposium on Advanced Research in Physics – 2020 Organised

by: Department of Physics Bangalore University in association with Sir M Visvesvaraya - ISRO Chair.



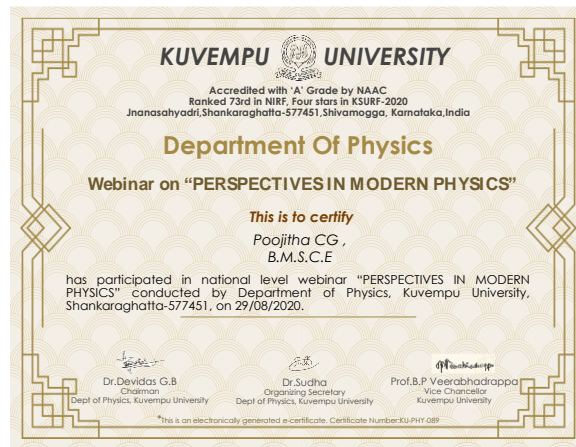
**June-July 30<sup>th</sup>, 2020: Mrs. Poojitha C.G**, Research scholar, Dept. of Physics participated in the participation at the Wiley Author Webinar Series “Learn to Publish” held in **June-July 2020**.



**August 27<sup>th</sup>, 2020: Mrs. Poojitha C.G** Research scholar, Dept. of Physics participated in the webinar on “Every company is an AI company: Now, Near future or Distant Future?” organised by IEEE computer society Bangalore chapter.



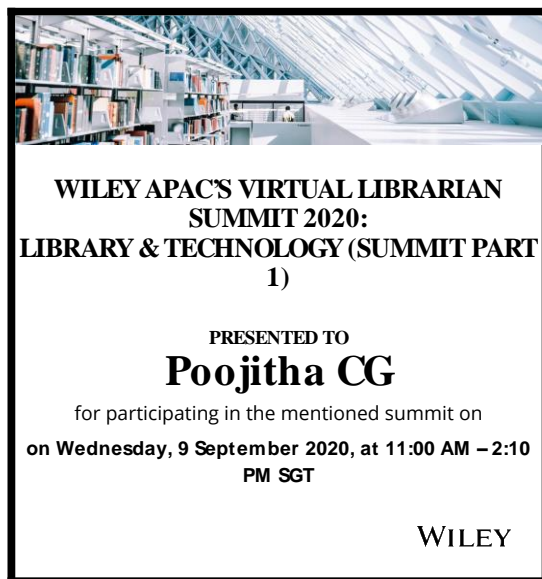
**29<sup>th</sup> August, 2020:** Mrs. Poojitha C.G Research scholar, Dept. of Physics participated in national level webinar on “Perspectives in Modern Physics” conducted by Dept. of Physics, Kuvempu University.



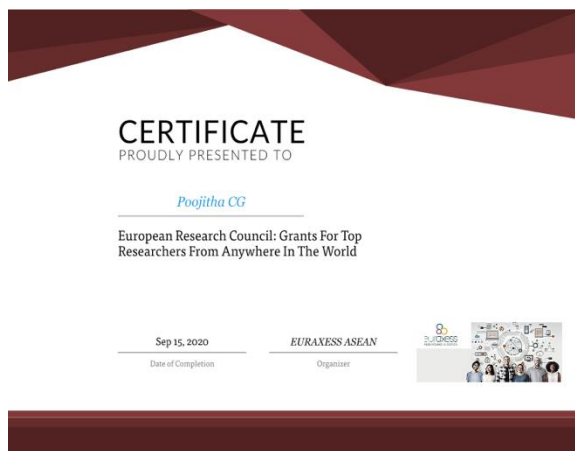
**September 22<sup>th</sup>- 24<sup>th</sup>, 2020:** Mr. Sumantha H.S, R Research scholar, Dept. of Physics participated in the Webinar Series on “Online Workshop on Rietveld Refinement Method” organized by UGC-DAE Consortium for Scientific Research, Mumbai Centre in association with Indore Centre from 22 - 24 September 2020.



**September 9<sup>th</sup>, 2020:** Mrs. Poojitha C.G Research scholar, Dept. of Physics participated in the Virtual librarian summit 2020 organised by WILEY.



**September 15<sup>th</sup>, 2020:** Mrs. Poojitha C.G Research scholar, Dept. of Physics participated in webinar on “Grants for top researchers from anywhere in the world” organised by European Research council: EURAXESS ASEAN.



**September 30<sup>th</sup>, 2020:** Mrs. Poojitha C.G Research scholar, Dept. of Physics participated in the webinar on scientific writing for Journals organised by Springer Nature in Collaboration with VTU.



**October 16th to 20th, 2020:** Mr. Sumantha H.S Research scholar, Dept. of Physics participated in the Online - International Workshop on X-ray Diffraction Analysis organised by Department of Physics, Siddaganga Institute of Technology, Tumakuru.

**Siddaganga Institute of Technology**  
 (An Autonomous Institution affiliated to VTU, Belagavi,  
 Approved by AICTE, New Delhi, Accredited by NAAC  
 with 'A' grade & ISO 9001:2015 Certified)  
 B. H. Road, Tumakuru – 572 103, Karnataka, INDIA

This is to certify that  
**Sumantha H. S.**  
 Research Scholar, Department of Physics,  
 BMS College of Engineering, Bangalore,  
 Karnataka India

has actively participated in the  
**Online - International Workshop on  
 X-ray Diffraction Analysis**  
 Organized by  
 Department of Physics  
 during 16<sup>th</sup> to 20<sup>th</sup> October 2020

**Dr. Suresh Kumar H. M.**  
 Professor & Head  
 Department of Physics

**Dr. K. P. Shivwananda**  
 Principal  
 SIT, Tumakuru

**Dr. Madhu Chennabasappa**  
 Convener and Resource Person  
 Department of Physics

**November 07, 2020:** Department of Physics organized Online Pre-Ph D Comprehensive Viva Voce Examination of Mrs. Poojitha C G, 1BM18PPY01, on the title “Studies on Radon and Radium Activity in Ground Water and Its Relation to Uranium Deposit” under the guidance of Dr. K.E Ganesh M V, Asst. Professor, Dept. of Physics .Google meet link: <https://meet.google.com/uxy-zmzu-tzm>

**B.M.S COLLEGE OF ENGINEERING**  
 Research Centre - Department of Physics  
 Pre-Ph.D. Comprehensive Viva-voce examination

Presentation on  
**STUDIES ON RADON AND RADIUM ACTIVITY IN  
 GROUNDWATER AND ITS RELATION TO URANIUM DEPOSIT**

**Poojitha C G**  
 1BM18PPY01  
 Full-time Research Scholar

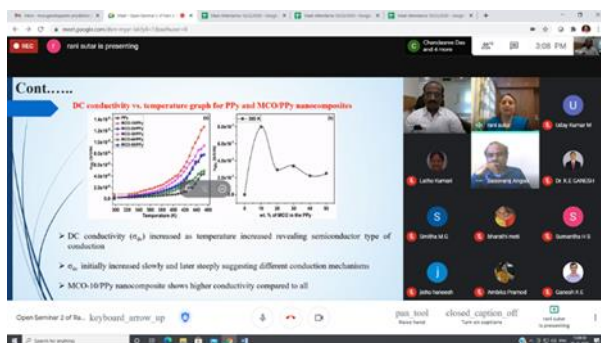
Under the guidance of  
**Dr. K.E Ganesh**  
 Assistant Professor and Research Supervisor  
 Department of Physics

**Dr. B.R. Suboo**  
 Scientific Officer (I) and Research Co-Supervisor  
 Radiological Physics and Advisory Division





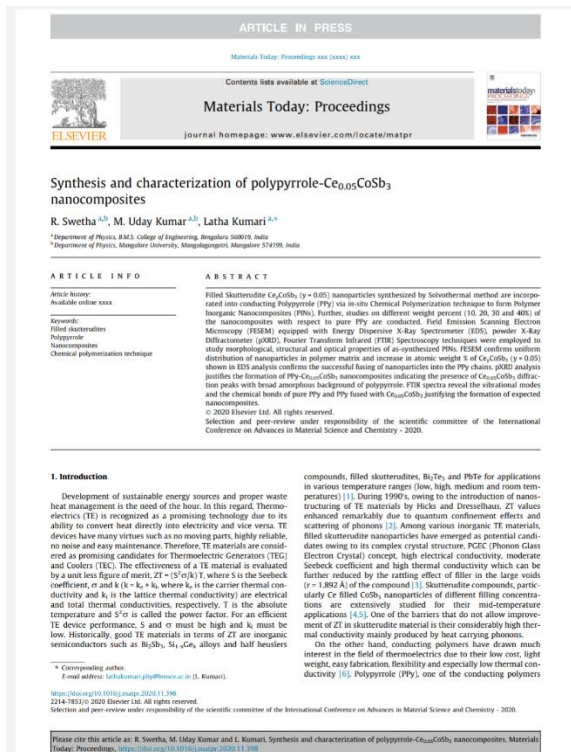
**December 10, 2020:** Mrs Sutar Rani Ananda Research scholar, Department of Physics doing her PhD under the guidance of Dr. Murugendrappa M V, Associate professor and Head, Department of Physics, delivered an Open seminar 2 of her PhD work online from 02.30 PM to 3.30 PM. The doctoral committee members Dr Basavaraj Angadi, Professor, Dept. of Physics, Bangalore University, Bangalore an external domain expert and Dr. Latha Kumari, Assistant Professor, Dept. of Physics, BMSCE an internal domain expert and the faculties and research scholars of BMSCE were present.



**December 21 to 23, 2020:** Mrs Ambika A.V & Mrs. Navya N Research scholars, Department of Physics presented a Flash Talk (Poster) Presentations of the Paper titled as “Electrochemical Determination of Dopamine Using Multiwalled Carbon Nanotubes” in NCLC 2020. Technical Program organised by Department of Applied Physics, Amity Institute of Applied Sciences, Amity University, Uttar Pradesh, Noida-201313, India

**December 29, 2020:** Swetha R, Uday Kumar M, Research Scholars, Department of Physics published a Paper entitled “Synthesis and characterization of polypyrrole-Ce<sub>0.05</sub>CoSb<sub>3</sub> nanocomposites” in Materials Today: Proceedings.

<https://doi.org/10.1016/j.matpr.2020.11.398>



**January 04, 2021:**Sumantha H S – Research Scholar of Department of Physics got the Sanction of Financial support of Rs.25,000/- for R & D activates. Title of the Proposal – Synthesis and Characterization of Nano materials as an anode material for lithium ion batteries

Navya. N – Research Scholar of Department of Physics got the Sanction of Financial support of Rs.25,000/- for R & D activates. Title of the Proposal – Opto-electrical and dielectric properties of nano doped liquid crystals.

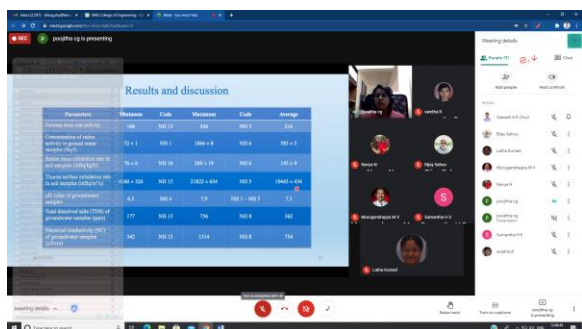
Udaykumar. M – Research Scholar of Department of Physics got the Sanction of Financial support of Rs.25,000/- for R & D activates. Title of the Proposal – Thermoelectric skutterudite (CoSb<sub>3</sub>) Nanomaterials for waste heat to electric energy conversion.

Swetha R – Research Scholar of Department of Physics got the Sanction of Financial support of Rs.25,000/- for R & D activates under COE/TEQIP III research with the Title of the Proposal – Thermoelectric efficiency studies of polymer – thermoelectric skutterudite Nanocomposites.

**January 12, 2021:** Mrs. Ambika A.V, Research Scholar, Department of Physics participated in the Research webinar on “How to Publish Good Research Articles in High Impact Journals” organized by the Department of Physics, Ramco Institute of Technology, Rajapalayam.



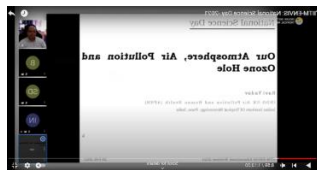
**February 20th, 2021:** Mrs. Poojitha C G Research scholar, Department of Physics doing her PhD under the guidance of Dr. K. E. Ganesh, Asst. Professor, Department of Physics, delivered an Open seminar 2 of her PhD work online on the Title of the work: "Studies On Radon And Radium Activity In Ground Water And Its Relation To Uranium Deposit" internal domain expert and the faculties and research scholars of BMSCE were present.



**February 26th, 2021:** Mrs. Poojitha C.G Research scholar, Department of Physics participated in online course on How to write a successful Ph.D Purposal organised by Euraxess, india.



**February 26th, 2021:** Mrs. Nisha P.G, Research scholar, Dept. of Physics participated in the IITM-ENVIS: National Science 2021 Webinar Live Talk by **Dr. Ravi Yadav, Scientist, INDO-UK Air Pollution & Human Health, IITM, Pune** ,on the Topic: : **Our Atmosphere, Air Pollution & Ozone Hole**



**March 02, 2021:** Mrs. Ambika A.V, Research Scholar, Department of Physics participated in National Level Webinar on “Physics in Everyday Life” organised by Department of Physics, BMS College of Women.

**March 04th, 2021:** Mr. Sumantha H.S, Research Scholar, Department of Physics participated in the International Webinar entitled “UNRAVELLING MYSTERIES OF THE UNIVERSE WITH EXPERTS” through Zoom platform. It was organised by Department of Physics Maitreyi College, University of Delhi.

**March 08, 2021:** Mrs. Nisha P. G, Research Scholar, Department of Physics Attended the celebration of the International Women’s Day on March 8, 2021 by Department of Science and Technology (DST), Ministry of Science and Technology. Event is jointly organized by DST, GOI and Japan Science and Technology Agency (JST), Japan, held from 12.00 hrs to 14.35 hrs in virtual mode



**March 10, 2021:** Mrs. Nisha P. G, Research Scholar, Department of Physics Attended the Ph.D. Viva Voce of Ms. Chinnu Sachidanandan scheduled through online mode in the School of Earth, Ocean and Atmospheric Sciences, Goa University on 10<sup>th</sup> March, 2021, Wednesday at 1530 hrs. Title: Long Term Trends of Currents and Hydrography along the Equatorial Indian Ocean Under the guidance of Dr. P.M. Muraleedharan

**February 15th-19th, 2021:** Mrs. Ambika A.V, Research Scholar, Department of Physics participated in One Week Faculty Development Program Sponsored by Centre of Excellence in Advanced Materials Research (TEQIP-III) on “Functional Materials for Engineering Applications” organised by Department of Physics & Chemistry in association with FET MJP Rohilkhand University, Bareilly.



Certificate- 15 to 19  
Feb 2021 Ambika A \

**March 18-20th, 2021:** Mrs. Poojitha C.G, Research Scholar, Department of Physics participated (Online) in National Conference on “Radiation Awareness and Detection in Natural Environment (RADNET- III)” jointly organized by Department of Physics, Govt. P.G. College

New Tehri, Tehri Garhwal and Department of Physics, H.N.B. Garhwal University Campus Badshahi Thaul, Tehri Garhwal(Uttarakhand).



**March 23, 2021:** Mrs. Poojitha C.G, Research Scholar, Department of Physics oral presented a paper titled “Estimation of radon and radium activity in ground water: A case study at Bengaluru, Karnataka, India” in 21st National Conference on Solid State Nuclear Track Detectors and Their Applications (SSNTDs-21) Jointly Organized by Department of Physics, Ramjas College and Department of Physics & Astrophysics, University of Delhi In Collaboration with Nuclear Track Society of India (NTSI).

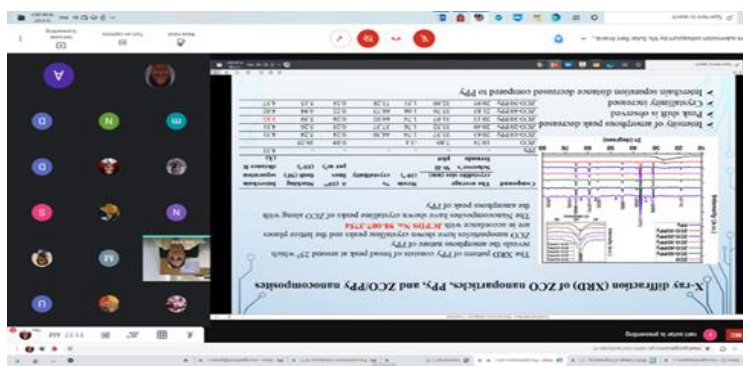


**April 05<sup>th</sup>-07<sup>th</sup> , 2021:** Mrs. Nisha P.G, Research scholar, Dept. of Physics Attended the "**International Conference on Space Science and Technology (ICSST 2021)**" organised by Space Education and Research Foundation, Ahmedabad, Emancitech and Team Unity



**April 19<sup>th</sup>, 2021:** The Department of Physics conducted online Pre-submission colloquium of Research scholar **Mrs. Sutar Rani Ananda (USN: 1BM16PGJ03)** on the topic “Polypyrrole and Ternary Oxide Nano Composites: Synthesis, Characterization and Transport Studies” under the guidance of Dr. Murugendrappa M.V, Associate Professor and Head, on the online Platform: Google meet url:

<https://meet.google.com/cgk-nebh-cun>





**May 26<sup>th</sup>, 2021:** Mrs. Nisha P.G, Research scholar, Dept. of Physics Attended the “Leveraging Web of Science for effective scientific research and writing” session by BMS College of Engineering

**June 12<sup>th</sup>, 2021:** Mrs. Poojitha C.G, Research scholar, Dept. of Physics participated in the National Webinar on "Fundamentals of Radiation Detection" organised by Dept. Of Physics, Aggarwal College Ballabgarh, Faridabad, Haryana.



**June 12<sup>th</sup>, 2021:** Mr. Udaykumar M, Research scholar, Dept. of Physics attended online open course on " Materials for Devices: An idea to Engineering startups" organised by Dept. Of Physics, B.M.S Institute of Technology and Management, Bengaluru - 560064.





**June 16<sup>th</sup>, 2021:** Mr. H.S.Sumantha, Research scholar, Dept. of Physics published a research paper entitled “Facile and eco-friendly combustion synthesis of NiO particles for photodegradation studies” in Chemical Physics Letters, Volume 779, 16 September 2021, 138837. **Q2 Journal with Impact Factor: 2.029** <https://doi.org/10.1016/j.cplett.2021.138837>

Chemical Physics Letters 779 (2021) 138837

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Chemical Physics Letters

journal homepage: [www.elsevier.com/locate/cplett](http://www.elsevier.com/locate/cplett)

Research paper

Facile and eco-friendly combustion synthesis of NiO particles for photodegradation studies

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<sup>b</sup> Department of Physics, School of Science, Block - L, Center for Post Graduate Studies (CPGS), Jain (Shreevidya) University, Jayanagar 3<sup>rd</sup> Block, Bengaluru 560011, Karnataka, India  
<sup>c</sup> Department of Chemistry, Siddaganga Institute of Technology (Affiliated to Visvesvaraya Technological University, Belgaum), Tumkur 577 103, Karnataka, India  
<sup>d</sup> Department of Studies and Research in Industrial Chemistry School of Chemical Sciences, Kuvempu University, Shimoga 577 451, Karnataka, India

**ARTICLE INFO**

**Keywords:**  
 NiO particles  
 Solid-state combustion method  
 DFT  
 Photocatalytic degradation

**ABSTRACT**

Nickel oxide (NiO) particles were synthesized by varying temperature through solid-state combustion method. The effects of annealing temperatures such as 650, 750, 850, 950, and 1050 °C, on the crystallite size, absorption properties, and photodegradation of methylene blue (MB) were studied. Progressive enhancement of crystallinity of the samples was clearly observed in FE-SEM images. The photocatalytic degradation of MB with different crystallite sizes was studied, showing that degradation increases with increasing the sample's crystallinity. The percentage of degradation of MB dye is found to be 96% in three hours. Furthermore, the density functional theory (DFT) studies have been performed for NiO to understand the linear optical and chemical properties. The DFT results are found to have a good correlation with the experimental findings.

**1. Introduction**

Transition metal oxides (TMOs) have shown remarkable properties such as structural flexibility, electrical, optical, and magnetic properties due to their electronic structure, surface properties, and defects [1]. Among other TMOs, the NiO particles show many unique magnetic, optical, electronic, and chemical properties, so they have shown great potential for application in various electrochemical systems as cathode material, solid oxide fuel cells (SOFC), dye-sensitized solar cells, semiconductors, p-type transparent conducting films, catalysis, anti-ferromagnetic layers, gas sensors, etc [2,3]. NiO particles are the p-type semiconductor material with a band gap between 3.0 and 4.0 eV, and it is attached to an excess of oxygen and vacant nickel atoms in the octahedral system [4,5]. NiO phases' oxides are ONiO, Ni<sub>2</sub>O<sub>3</sub>, Ni<sub>3</sub>O<sub>4</sub>, Superoxide NiO<sub>2</sub>, and Peroxide Ni(O<sub>2</sub>). Metal oxides(MO) are synthesized by different methods as spray pyrolysis, sputtering, electrodeposition, thermal decomposition, sol-gel techniques, chemical bath deposition, co-precipitation, hydrothermal method, etc. [6–13]. Table 4a suggests that there is one stop solution to directly correlate bandgap, crystallite size and percentage of degradation as every technique is unique and thus the methodology employed in preparation of nanoparticle plays a vital role. According to the data, the NiO particle synthesized through solid state combustion technique has significantly surpassed all other methods viz., hydrothermal, sol-gel, chemical precipitation, green synthesis and calcined hydrothermal method. As the results of present work lead to very lesser band gap energy which there by improved the efficacy of photodegradation upto 96% for the duration of 3 h. However, from Table 4b, there is a quite contradicting and imperative results which could be found in 3d transition elements. As per previously reported work in the solid state combustion technique, it can be concluded that as the annealing temperature increases, the crystallite size also increases, thereby leading to enhanced photodegradation of MB. Though, NiO at operational 600 °C exhibits very low percentage of photodegradation compared to CuO and ZnO. It was an inquisitive interest to establish the fact that the photodegradation enhanced as annealing temperature increases and thus leading to much better photodegradation. Though photocatalysis is low, the plot of this work is to establish a suitable material which can photocatalyze at visible wavelength.

Nandiyanto et al. have shown the direct correlation between crystallite size and degradation efficiency [14]. According to Almqvist and colleagues, the photocatalytic efficiency of particles improves as the crystallite size grows due to optimization of optical properties and charge carrier dynamics [15]. The technique of fine-tuning crystallite

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