

Curriculum Vitae

KOMAL

M.Sc. Physics
Department of Physics
Kurukshetra University, Kurukshetra
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Personal Information

- Name : Komal
- Date of Birth : 20-10-2001
- Nationality : Indian
- Gender : Female
- Marital Status : Single
- Spoken Languages : English, Hindi (mother tongue)
- Hobbies : Internet savvy, Music, Dance, travelling, Stargazing, observing celestial events
- Present Address : #789 D.D. Colony, Kurukshetra-136131, Haryana, India

Career Objective

Dedicatedly pursuing my love for Physics, I am now seeking admission into a Ph.D. program with the aim of exploring diverse fields like Material science and condensed matter physics along with actively adding value through advanced research initiatives. Excelling in an advanced academic setting is my objective, as I have a robust background in research along with expertise using different software. My aim is to leverage these skills along with my previous accomplishments.

Academic Qualifications

- **MSc in Physics** (2020-22)
 - Department of Physics
 - Kurukshetra University, Kurukshetra, India
 - **CGPA: 9.35/10**
- **BSc with Physics, Chemistry and Mathematics** (2017-20)
 - Institute of Integrated and Honors Studies, Kurukshetra University, Kurukshetra
 - **Percentage: 87.34%**
- **10+2 with Physics, Chemistry and Mathematics** (2017)
 - Central Board of Secondary Education, India
 - **Percentage: 95.6%**
- **10-th standard** with English, Hindi, Maths, Science, Social Science (2015)
 - Central Board of Secondary Education, India

- CGPA: 9.8/10

Research Highlights

Major Project

Title: Structural and Optical studies of Argon ion implanted Polypropylene

Virgin and Ion implanted polypropylene specimen are investigated using GXRD and UV visible spectroscopy. I found that there is a gradual reduction in crystal size with increasing ion dose whereas FWHM shows an increase with increasing fluences. The optical absorption studies have been studied using UV-visible spectrophotometer. The absorption of the specimen was found to increase with increasing fluence. This optical change in properties are due to several factors such as rupturing of original bonds in polymer leading to the chain scission, free radical formation, cross linking which in turn causes formation of new bonds with modified structure in the form of carbonaceous network.

Collaborative projects

Title: Synthesis and characterization of Co_3O_4 as an electrode material for supercapacitor

In the project work, I have synthesized the Co_3O_4 nanostructures via the hydrothermal method. The structural and morphological properties were investigated by X-ray diffraction and scanning electron microscope, respectively. The electrochemical properties specific capacitance and resistance (bulk, charge transfer) were examined by cyclic voltammetry, and impedance spectroscopy respectively.

Title: Water purification by using magnetic nanoparticles

In this, I found out that the most efficient magnetic nanoparticles in the removal of cultivable E. coli cells were the FeO and MnFeO particles with 99.2 % of removal efficiency. The CuFeO and the CoFeO particles were slightly less efficient, not exceeding 98.8 % of removal efficiency. The least efficient particles were CFeO@CVD, with efficiencies below 90 %. The aqueous stable carboxyl functionalized Fe_3O_4 magnetic nanoparticles (carboxyl MNP) were obtained by co-precipitation method and the ability of surface engineered MNP to capture bacterial pathogens was examined using E. coli BL-21 as a model microorganism

Title: Energy storage Devices

In this project, electrochemical studies are performed using Cyclic Voltammetry (CV) and Galvanostatic charge discharge (GCD) methods, and power density and energy density of the battery, capacitor and supercapacitors are calculated. I found that energy density and power density of supercapacitor lies between battery and capacitor.

Teaching Experience

Teaching in Physics and Mathematics:

- Delivered individualized home tuition sessions focused on Physics and Mathematics since 2019

- Tailored teaching methodologies to align with student's learning objectives
- Aided students in grasping complex concepts, leading to notable advancement in their grades and understanding.
- Motivated students towards learning and studying to build self-confidence and reduce fear of failure.
- Leveraged technology to accelerate learning by providing students with easy-to-access information
- Administered standardized tests to assess student strengths and weaknesses.
- Created personalized lesson plans to meet needs of diverse learners.
- Set up visual aids, equipment, and displays to support lesson delivery. Delivered personalized educational, behavioural, and emotional support to individual students to enable positive learning outcomes.

Achievements and Awards

- **Central Teacher Eligibility Test (CTET)-2023:** Qualified
- DST (Department of Science and technology) scholarship holder- POSE (Promotion of scientific education) **(2017-22)**
- **Seminars presented:**
 - Unijunction transistor- its operation, characteristics and applications,
 - GM Counter (Particle Detector) – its principle, working, units and types during masters and obtained **Outstanding grade**.
- Got offer letter from **Infosys limited** as Operations Executive
- District rank holder in 12th Standard
- **NSTSE** (National-level science talent search examination): Qualified
- **IMO** (International Maths Olympiad): Qualified
- Certificate in **Computer Education** (level-1)
- Certificate in **First Aid**
- Certificate in **Home Nursing**
- Secured 1st position in science exhibition for model of transformer
- Secured 3rd position in Science Quiz competition held at college level
- Participated in “**Annual Science Quiz**” organized at Kurukshetra Panorama and Science Centre
- Certificates of **NSS** (National Service Scheme) special camps

Research Interests

My aspiration is to investigate nanomaterials and quantum materials -their unique properties and unlock their potential for transformative technological innovations and to cultivate a comprehensive understanding of different materials and enable me to contribute in new inventions, discoveries and design novel materials, fostering innovations. I am committed to exploring the intricate relationships between structure, composition, and functionality of materials, aiming to contribute to advancements in research and development field.

Experimental and Instrumentation Skills

- Study optical properties of materials using UV Visible- NIR spectrometer.
- Determine atomic arrangements using glancing angle X-ray Diffractometer.
- Synthesis and characterization of electrode material for Supercapacitor.
- Handling of instruments for SEM (Scanning Electron Microscopy), EDS (Energy-Dispersive X-ray Spectroscopy)
- Determination of double layer capacitance and conductivity of the material by using Electrochemical Impedance Spectroscopy (EIS)

Technical Skills

- Skilfulness in using Origin Professional, gnuplot
- Microsoft Office Suite
- Proficient in Computer programming languages: Java, Python, C++, Fortran

Core Skills

- Critical thinking
- Problem Solving
- Management
- Leadership
- Project support
- Team collaboration
- Lab result interpretation
- Learning assessments
- Event organization
- Decision-Making
- Flexible and Adaptable

Additional Activities

- Active **NSS (National Service Scheme)** volunteer:
 - Used strong interpersonal communication skills to convey information to others.
 - Assisted with special events and programs.
 - Supported engaging, fun, and smooth-running events by helping with organization and planning.
 - Provided administrative support to department leads to help organize events and fundraisers.
 - Tutored at various competency levels to help people with reading, math and writing skills. Completed daily domestic tasks in shelters and group homes to assist people in need. Participated in volunteer orientations and training sessions to learn about organizational changes and mission updates.
 - Coordinated and managed volunteer activities for community service projects.
 - Educated young people about strategies for driving discussions and promoting social changes.

- Maintained internal database of service workers, participants, activities and other relevant details.
- Active member of **Youth red Cross society** and **first-Aid**
- Attended various Science Conclaves
- Attended **Seminars**:
 - A brief seminar on High energy Physics by Dr. Renuka Godbole (IIT, Delhi)
 - A brief seminar on Quantum Particles by Dr. Manish K Kashyap (Jawaharlal Nehru University, New Delhi)
- Head of Projects at school and college level
- Head girl at School level
- Class Representative (CR) at university level
- Participated in literacy drive and community development projects
- Participated in Yoga Training and hospital service projects

Languages

- English
Advanced (C₁)
 - **IELTS (International English Language Testing System)**
 - **Overall- 8 Band**
 - Reading-8.5, Listening-8.5, Writing-7, Speaking- 7
- Hindi
Bilingual or Proficient (C₂)

Declaration

I hereby declare that the details stated above are true and correct to the best of my knowledge.