

# CURRICULUM VITAE

**Dr. Arum Kumar**

**Ph.D. Department of Metallurgical and Materials Engineering  
Indian Institute of Technology Roorkee, India.**

**Current Position:**

**Assistant Professor, Department of Chemistry  
K.S. Saket college, Dr. Ram Manohar Lohia Avadh University, Faizabad-  
ayodya, India.**

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## **OBJECTIVE:**

- To work in growth oriented organization and to obtain a very challenging position that will utilize my expertise, education and background, expand knowledge, and offer opportunities for personal and professional growth.

## **RESEARCH AREA OF INTEREST:**

- High Performance Polymer Nanocomposites.
- Surface modification of nano filler to improve interfacial interaction between nano fillers and polymer matrices.
- Polymer Adhesive Joining of Similar and Dissimilar Metals.
- Cluster breaking and homogeneous dispersion of nano fillers in polymer matrix.
- Control of configuration on chiral carbon centre during polymerization on the surface of nano fillers with the help of migratory insertion reaction using transition metals catalyst.
- Mechanical and physical properties of Polymer Nanocomposites.
- Nanomaterials synthesis and characterization..

## **RESEARCH DEGREE:**

<b>Degree</b>	<b>Year</b>	<b>Title</b>	<b>Institute</b>
Ph.D.	July, 2012 to October, 2018	Epoxy Based CNT Nanocomposites with Advanced Physical and Mechanical Properties	<b>Indian Institute of Technology (IIT) Roorkee, India</b>

## ACADEMIC QUALIFICATIONS:

Degree	Year	Discipline/Branch	University/Institute	Marks%/C GPA
M.Tech.	2012	Polymer Science And Engineering	Indian Institute of Technology (IIT) Delhi, India	7.9/10
M.Sc.	2008	Chemistry	Gurukula Kangri Vishwavidyalaya, Haridwar, Uttarakhand, India	71%
B.Sc.	2005	Physics, Chemistry, Mathematics	C.C.S. University Meerut, India	54%

## EXPERIENCE:

- **Assistant Professor (April 2019 – Till date)** in Department of Chemistry, K.S. Saket College, Dr. Ram Manohar Lohia Avadh University, Ayodhya, India.

### Subjects taught:

- Polymer Composite Materials (Undergraduate & Postgraduate levels).
- Characterization techniques (TGA, DSC, DMA, Raman, FTIR, XRD, NMR, TEM, FESEM and Mossbauer) in Materials Science (Undergraduate & Postgraduate levels).
- Role of organometallic chemistry in polymer (Postgraduate level).
- Polymer Chemistry.
- Nanomaterials synthesis and characterization.
- **Senior Research Fellowship (July, 2014–July, 2017)** in Indian Institute of Technology (IIT) Roorkee (Department of Metallurgical and Materials Engineering).
- **Junior Research Fellowship (July, 2012–July, 2014)** in Indian Institute of Technology (IIT) Roorkee (Department of Metallurgical and Materials Engineering).
- **Teaching Assistant (July, 2012–July, 2017)** in Indian Institute of Technology (IIT) Roorkee (Department of Metallurgical and Materials Engineering). Job: As DMA, DSC, TGA operator for visco-elastic mechanical and thermal properties of materials.
- **Quality Assurance Officer (January, 2008–June, 2010)** in Ranbaxy laboratories PVT. LTD, to assure the quality of finished product as well as raw materials.

## AWARDS AND FELLOWSHIP:

- **Qualified**, GATE 2010 in **Chemistry** discipline with **All India Rank 179**, conducted by Indian Government.
- **Qualified**, National Eligibility Test and junior Research Fellowship (NET-JRF) 2011 in **Chemistry** discipline with **All India Rank 74**, conducted by Indian Government.
- **National Post Doctoral Fellowship (NPDF)** awarded Science and Engineering Research Board of India.

## Ph.D WORK DETAILS:

- Awarded Ph.D. degree on topic: **“Epoxy Based CNT Nanocomposites with Advanced Physical and Mechanical Properties”** at Indian Institute of Technology (IIT) Roorkee (October 7, 2018).

This work involves the in-depth investigation of multiwall carbon nanotube (MWCNT)-epoxy nanocomposites containing cluster free uniform dispersion of different types of MWCNTs (MWCNTs, MWCNT/APTES and MWCNT/TiO<sub>2</sub>) in „bisphenol A“ based epoxy matrix prepared by innovative ultrasonic dual mixing (UDM) technique. In this study, MWCNTs is synthesized by chemical vapour deposition method using in house developed chemical vapour deposition reactor. This study investigates the effect of processing technique parameters, surface modification of MWCNTs and MWCNTs content as well as their dispersion scenario in the epoxy matrix on mechanical properties, thermal properties, fracture properties and viscoelastic properties of epoxy nanocomposites. In order to improve interfacial interaction of MWCNTs with epoxy matrix, surface modification of MWCNTs has been done by attaching 3-Aminopropyl triethoxysilane (APTES) on the surface of MWCNTs (MWCNT/APTES). To avoid the degradation in atomic structure arrangement of carbon atoms in MWCNTs by critical chemical oxidation process during functionalization of MWCNTs, the surface modification of MWCNTs has been also done by decorating its surface with TiO<sub>2</sub> nanoparticles and formed a new hybrid structure of nano filler (MWCNT/TiO<sub>2</sub> hybrid filler). The morphology of newly formed MWCNT/TiO<sub>2</sub> hybrid nano filler and MWCNT/APTES has been studied using transmission electron microscopy (TEM). Further the prospect of using such epoxy nanocomposites as adhesive and as coating material in preparation of superior adhesive joints of mild steel have been explored by studying the mechanical and fracture properties of lap joint of mild steel sheet and anti-corrosion properties for mild steel. Toughening mechanisms of epoxy nanocomposites has been investigated by examining the fracture surfaces of tensile test, 3 point bend test and single lap joint test specimens using field emission scanning electron microscopy (FESEM) in order to understand the structure-property relationships of the epoxy Nanocomposites.

Guide: **Prof. P.K. Ghosh**, Place: **Indian Institute of Technology Roorkee (Department of Metallurgical and Materials Engineering)**

Co-guide: **Prof. K.L. Yadav** Place: **Indian Institute of Technology Roorkee (Department of Physics)**.

## M.Tech. MAJOR PROJECT DETAIL:

- M.Tech. Major Project (Thesis work), Topic: **“studies on needle punched nonwoven jute/PP hybrid fabric reinforced polypropylene laminate composite”** at Indian institute of technology, Delhi (IIT Delhi).

Guide: **Prof. B.K Satapaty**, Place: **Indian Institute of Technology Delhi (Centre of polymer science and engineering)**.

Co-guide: **Prof. Amit Rawal** Place: **Indian Institute of Technology Delhi (Department of Textile)**.

## LIST OF PUBLICATIONS:

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### Published

1. Arun Kumar, Kaushal Kumar, P.K. Ghosh, Ankit Rathi, K.L. Yadav and Raman “MWCNTs toward superior strength of epoxy adhesive joint on mild steel adherent”. *Composites Part B: Engineering* (2018), Vol.143, Pages 207-216. *Elsevier* (**Impact Factor 6.86**) (*Citations-07*)
2. Arun Kumar, Kaushal Kumar, P.K. Ghosh and K.L. Yadav “MWCNT/TiO<sub>2</sub> hybrid nano filler toward high-performance epoxy composite”. *Ultrasonic Sonochemistry* (2018), Vol.41, Pages 37-46. *Elsevier* (**Impact Factor 7.27**), (*Citations-10*)
3. Kaushal Kumar, Arun Kumar and P.K. Ghosh “UDM enhanced physical and mechanical properties through the formation of nanocavities in an epoxy matrix”. *Ultrasonic Sonochemistry* (2018), Vol.40, Pages 784-790. *Elsevier* (**Impact Factor 7.27**), (*Citations-01*)
4. Kaushal Kumar, Sudhir Kumar, Arun Kumar, Ramkishor Anant, and Ravindra Kumar “Viscoelastic and thermally stable PDMS-SiO<sub>2</sub> filled epoxy adhesive joint on steel substrate”. *Polymer Composites* (2017), Vol.39, Pages 2889-2896. *Wiley* (**Impact Factor-2.26**)
5. M.S. Goyat, Vikram Jaglan, Vikram Tomar, Guillaume Louchaert, Arun Kumar, Kaushal Kumar, Amneesh Singla, Rajeev Gupta, Uday Bhan, Santosh Kumar Rai and Sudesh Sharma “Superior thermo-mechanical and wetting properties of ultrasonic dual mode mixing assisted epoxy-CNT nanocomposites”. *High Performance Polymers* (2017), Vol.31, Pages 32-42. *SAGE Journals* (**Impact Factor 1.58**)
6. Arun Kumar, P.K. Ghosh, K.L. Yadav and Kaushal Kumar “Thermo-mechanical and anti-corrosive properties of MWCNT/epoxy nanocomposites fabricated by innovative dispersion technique”. *Composites Part B: Engineering* (2017), Vol.113, Pages 291-299. *Elsevier* (**Impact Factor 6.86**), (*Citations-36*)
7. Arun Kumar, Ramkishor Anant, Kaushal Kumar, Sampat Singh Chauhan, Sudhir Kumar and Ravindra Kumar “Anticorrosive and electromagnetic shielding response of graphene/TiO<sub>2</sub>-epoxy nanocomposite with enhanced mechanical properties”. *RSC Advances* (2016), Vol.6, Pages 113405-113414. *Royal Society of Chemistry* (**Impact Factor 3.04**), (*Citations-11*)
8. Kaushal Kumar, P.K. Ghosh, and Arun Kumar “Improving mechanical and thermal properties of TiO<sub>2</sub>-epoxy nanocomposite”. *Composites Part B: Engineering* (2016), Vol. 97, Pages 353-360. *Elsevier* (**Impact Factor 6.86**), (*Citations-36*)
9. P.K. Ghosh, Arun Kumar, and Kaushal Kumar “Improving thermal and electrical properties of graphene-PMMA nanocomposite”. *Polymer Science Series A* (2015), Vol. 57, Pages 829-835. *Springer* (**Impact Factor 0.98**), (*Citations-04*)
10. P.K. Ghosh, Kaushal Kumar, and Arun Kumar “Studies on thermal and mechanical

properties of epoxy-silicon oxide hybrid materials”. Journal of Materials Engineering and Performance (2015), Vol. 24, Pages 4440-4448. *Springer (Impact Factor 1.47)*

11. Ashangbam Satyavrata Singh, Sudipta Halder, Arun Kumar, Peiyuan Chen “ Tannic acid functionalization of bamboo micron fibres: Its capability to toughen epoxy based biocomposites” Materials Chemistry and Physics (2020), Vol. 243, Pages 122112. *Elsevier (Impact Factor 3.4)*
12. Raman, Matthias Albiez, PKGhosh, Thomas Ummenhofer, Arun Kumar “Behavior of UDM processed epoxy based TiO<sub>2</sub> nano filler composite adhesive joints under fatigue loading” Materials Research Express (2019), Vol. 6, 095303. IOP (*Impact Factor 1.9*)
13. PKGhosh, Kaushal Kumar, Arun Kumar “UDM processed superior acrylic resin based ZrO<sub>2</sub> nanoparticle reinforced composite for dental application” Materials Research Express (2019), Vol. 6, 105404 (*Impact Factor 1.9*)

## CONFERENCES:

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1. Participated and Presented a Paper in the International Conference on **Advances in Materials & Processing: Challenges and Opportunity (AMPCO 2017)** organized by Indian Institute of Technology (IIT) Roorkee.  
**Title:** Viscoelastic and Thermal Behavior of UDM Processed CNT-Epoxy nanocomposite.
2. Participated and Presented a Research Paper in the National Conference on **Global Challenges- Role of Science & Technology in Giving their Solutions** organized by Department of Applied Science & Hum., ECE & CSE School, The Technological Institute of Textile & Sciences Bhiwani Haryana. **Title:** Study on Lap Shear Joints and Fracture Characterizations of Metallic Particles Reinforced Epoxy Adhesive
3. Participated and Presented a Research Paper in the National Seminar on **Advance Materials and Devices** organized by Department of Physics, School of Basic Science.ITM University Gurgaon.  
**Title:** Characterization of Nanometric Thin films of ZnO grown by Atomic Layer Deposition

## LIST OF SHORT COURSES & WORKSHOP:

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1. Organizing member of the workshop held on October 24, 2017 organized by School of Basic Science and Humanities, Lingaya"s University Faridabad (In collaboration with CMS-Vatavaran). Title: **Recent Advances in Sciences & Technology.**
2. Participated in Faculty Development Program (FDP) held on August 2, 2017 organized by Lingaya"s University Faridabad.  
**Title: Effective Engagement & Communicate to Connect.**
3. Participated in the short course held on April 2, 2014 organized by Department of Electronics and Communication Engineering, IIT Roorkee & IEEE-Electron Device Branch Chapter, IIT Roorkee. Title: **Nanotechnology Journey from Quantum Physics to Nanoengineering.**
4. Participated in the IEEE EDS Mini-Colloquium on September 19, 2014 organized by Department of Electronics and Communication Engineering IIT Roorkee & IEEE-Electron Device Branch Chapter, IIT Roorkee.  
**Title: Nanoscale Device Physics and Reliability.**
5. Participated in the workshop held on October 11-12, 2014 organized by MHRD-IPR Chair, Department of Management Studies, IIT Roorkee.

Title: **Considering Industry Stake-Holding in Lab Research.**

6. Participated in the workshop held on March 05, 2016 organized by Department of Mechanical & Industrial Engineering, under QIP Programme, IIT Roorkee.

Title: **Failure Prevention of Welded Structure through Control of Residual Stress and Hydrogen Embrittlement.**

## TECHNICAL SKILLS:

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- Hands on experience number of instruments including: Optical Microscopy, Hall instrument, Ultrasonic mixing instrument, CHN Analyzer, Tensile testing, Fourier transform infrared spectroscopy (FTIR), Dynamical Mechanical Analyzer (DMA), Differential Scanning Calorimetry (DSC), Thermo Gravimetric Analysis (TGA), Ultramicrotome to prepare TEM samples, Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), X-Ray diffraction spectroscopy, UV-Vis-NIR absorption spectroscopy.
- Reviewer of the journals Polymer composites, Journal of Porous materials and RSC Advances.
- I have mentored Twenty B.Tech. Student for their project work at IIT Roorkee during my Ph.D. period.

## PERSONAL INFORMATION:

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Name	Arun Kumar
Gender	Male
Marital Status	Married
Community	GEN
Father's Name	Late satypal Singh
Date of Birth	01-07-1984
Height	5'8"
Home Town	Muzaffar Nagar (U.P.)
Languages Known	Hindi & English
Hobbies	Listening Music, Playing Cricket, Badminton

## REFERENCES:

Dr. P.K. Ghosh (Professor)  
Metallurgical & Materials Engg. Deptt.  
Indian Institute of Technology Roorkee

Dr. K.L. Yadav (Professor)  
Physics Department  
Indian Institute of Technology Roorkee

## Declaration:

I hereby declare that the above-mentioned information is correct up to my knowledge and I bear the responsibility for the correctness of the above-mentioned particulars.

Dr. Arun Kumar  
I.I.T. Roorkee, India