

## Gaurav Modi

B.Tech. Metallurgical & Materials Engineering

UG (IV Year II Semester)

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Indian Institute of Technology Roorkee

**Areas of Interest:** Carbon nanostructures, Nanomaterials, Semiconductors.

Educational Qualifications	Year	Board/Institution	CGPA* / %
B.Tech. (up to 3rd Year)	2014	Indian Institute of Technology, Roorkee	9.355
Twelfth	2011	Kerala Samajam Model School (I.S.C)	96.5
Tenth	2009	Kerala Samajam Model School (I.C.S.E)	96.4

\*on a scale of 10

## RESEARCH PUBLICATIONS

Sinha, A., **Modi, G.**, (2014). Penrose Tilings and Parity Conditions. Proceedings of the National Academy of Sciences, India Section A: Physical Sciences (Springer), 84(4), 571-576.

<http://dx.doi.org/10.1007/s40010-014-0161-5>

## INTERNSHIP INFORMATION

### University of Kiel, Germany

#### **Synthesis of tetrapod-shaped zinc oxide nano-microstructures by flame transport synthesis approach** (May-July (2014))

Worked on a research project under Dr. Yogendra Kumar Mishra, Group leader at Functional Nanomaterials, University of Kiel. Different morphologies of the tetrapod shaped zinc oxide (ZnO-T) nano-microstructures were synthesized by the novel flame transport synthesis (FTS) approach by suitable adjustments in the growth conditions. The fabricated nano-microstructures were characterized in detail using high-end-characterization instruments and its photocatalytic properties against methylene blue dye was reported.

### National Metallurgical Laboratory (NML-CSIR) (Jamshedpur)

#### **Penrose tiling and quasiperiodic lattices** (May-July (2013))

Worked on a project under Dr. Arvind Sinha, Senior principal scientist and group leader at Biomaterials group, NML. The objective was to establish the physical significance of the parity conditions and to examine whether such conditions are necessary and sufficient to generate Penrose tiling on a two dimensional plane. Penrose tilings were studied as a model for representing quasicrystals.

## RESEARCH PROJECTS

### IIT Roorkee

#### **Synthesis of CNT on metallic foams for field emission applications** (July 2014 - present)

The advisor of this research project is Dr. Indranil Lahiri. Carbon nanotubes (CNT) have been synthesized on various metal foams by the Chemical Vapor Deposition (CVD) technique. Catalyst was deposited on the metal foam substrate by dipping it in suitable metal salt solutions after which it was placed in a CVD chamber. Metallic foams were used primarily to increase the effective surface area for the growth of CNTs. The CNTs fabricated on these substrates are being characterized in detail by Scanning Electron Microscope (SEM) and Raman Spectroscopy and subsequently being tested for their field emission characteristics.

## **IIT Roorkee**

### **Electromagnetic (EM) wave absorption properties of Ni-coated ZnO nano-microstructures** (July 2014 – present)

This research project is being done under the guidance of Dr. Vijaya Agarwala. Tetrapod shaped ZnO nano-microstructures were synthesized by the Flame Transport Synthesis (FTS) process and subsequently coated with nickel by the electroless deposition technique. The fabricated nano-microstructures were characterized using Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), X-ray Diffractometer (XRD), Raman spectroscopy and its EM wave absorption characteristics were examined using a Vector Network Analyzer (VNA).

## **IIT Roorkee**

### **Hybrid nanomaterials for therapeutic and imaging applications** (July 2014 – Dec. 2014)

This was a literature review work done by a team of three bachelor students on the synthesis of hybrid bio-nanomaterials and their applications in the field of therapeutics and imaging. It was carried out under the supervision of Dr. B.V. Manoj Kumar and Dr. Indranil Lahiri. Two types of hybrid nanomaterials, silica-based and nanoscale metal-organic framework based, were studied primarily and their potential to be used in the imaging and therapy applications was examined. A report was submitted on successful completion of the review work.

## **SKILLS**

<b>Computer Languages</b>	Java
<b>Software Packages</b>	Microsoft Office, SolidWorks, Thermo-Calc, Adobe Photoshop
<b>Characterization instruments</b>	Familiar with the handling and operation of Scanning Electron Microscope (SEM), X-ray Diffractometer (XRD), UV-vis Spectrophotometer etc.

## **ACADEMIC ACHIEVEMENTS**

- 1) Secured a rank of 3397 among the 0.5 million students appearing for IIT- Joint Entrance Examination and was in the top 1% student category all over India
- 2) Ranked 2<sup>nd</sup> in the Metallurgical and Materials Engineering department amongst 90 students
- 3) Awarded the DAAD-WISE scholarship for conducting scientific research in Germany for the duration of May-July 2014
- 4) Awarded Gold Medal for obtaining 96.5% in 12th class and securing 1<sup>st</sup> place in school
- 5) Awarded Silver Medal for obtaining 96.4% in 10th class and securing a place among the top three students in school
- 6) Awarded the rolling trophies for securing 100% in Computer Applications and Mathematics in class X and class XII board examinations respectively.

## **EXTRA CURRICULARS**

### **Member, National Service Scheme, Govt. of India** (2011-2012)

Active member of National Service Scheme and provided free tuitions to the lesser privileged children. I have also actively volunteered in events such as blood donation camps, cloth collection drives and social awareness campaigns.

### **Coordinator, Tatva Cognizance'14** (2014)

Successfully coordinated and organized the technical paper presentation event at Cognizance, the technical festival of IIT Roorkee. I was given the responsibility to manage more than 50 teams from colleges all over India.

### **Coordinator, Events, Srishti.** (2013)

Successfully coordinated various events at Srishti, the annual techno-cultural festival of IIT Roorkee. Also assisted in putting up an exhibition by the Philately and Numismatics section (Hobbies club)

### **Member, Material Advantage** (2014)

Active member of this student program for materials science and engineering.