

## Dr. Chetan C. Singh

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**Specialization:** Materials Science

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## Education

Examination	University	Institute	Year	CPI / %
Ph.D.	IIT Gandhinagar	IIT Gandhinagar	2018	8.36
Post-Graduation	IIT Bombay (M.Tech.)	Metallurgical Engineering and Materials Science	2012	8.62
	Sardar Patel University (M.Sc.)	Department of Materials Science	2010	70.83
Undergraduate Specialization: Physics				
Graduation	Mumbai University (B.Sc.)	V.E. S College of Arts Science and Commerce	2008	70.75
Intermediate/+2	M.S.B.S.H.S.E	N.S.J.C.	2005	73.00
Matriculation	M.S.B.S.H.S.E	V.E.S.	2003	73.46

## Work Experience:

- 1) Project Research Scientist at IIT Bombay, Mumbai, India (September 2018- March 2018)**
- 2) Institute PostDoctoral Fellow at Energy Science and engineering department, IIT Bombay, Mumbai, India (April 2018- till now)**
  - Low pressure phase change in methyl ammonium lead iodide (MAPI) particles.
  - Synthesis and characterisation of oxide materials (i.e. Cu doped NiOx and SnO<sub>2</sub>) by low temperature plasma assisted sol-gel process for triple cation perovskite based solar cells.

## Doctor of Philosophy

**Supervisor:** Prof. Emila Panda

**Thesis Title:** Microstructure influenced bulk optoelectronic and surface electrical properties of low cost materials for photovoltaic application: The case of Al-doped ZnO and SnS.

**Coursework:** Solar Photovoltaic, fundamental, technologies, and applications, Materials and processes for semiconductor devices, Introduction to Nanotechnology.

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## Master of Technology (M. Tech.) in Materials Science

**Supervisor:** Prof. Ram Chandra Prasad

**Thesis Title:** Development and characterization of fly ash cenosphere reinforced epoxy matrix and glass fiber laminate composites.

**Coursework:** Engineering Polymers and Composites of Materials, Characterization of Materials, Advanced Composites, Concept in Materials Science, Diffusion and kinetics, Non-Crystalline materials, Modelling and analysis and Advanced Manufacturing Processes2.

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## **Master of Science (M.Sc.) in Materials Science**

**Supervisor:** Prof. Satish Manocha and Prof. Lalit Manocha

**Thesis Title:** Development and characterization of Silver loaded PAN based activated nano porous carbon fiber.

**Coursework:** Modern characterization technique, Selected topics in nanoscience and nanotechnology, composites of materials, Thermodynamics of materials, Vacuum and thin film deposition, and Engineering Polymers.

### **Scholastic Achievements**

- **Rank 3** in Materials Science and Nanoscience department (M.Sc.) in the batch of 34 students.
- Qualified national level competitive exams, Graduate Aptitude Test Exam (**GATE**) with **AIR 65** out of 2037 student and 96.81 percentile in 2010.
- Recipient of **MHRD** fellowship and IIT Gandhinagar additional fellowship during Ph.D.
- Passed the Examination in Mathematics conducted by Maharashtra Vidyapeeth and secured **Distinction** grade in March 1996.
- Passed the Examination in Mathematics conducted by Maharashtra Vidyapeeth and secured **First** grade in March 1997.

### **Position of Responsibility**

#### **Teaching Assistant**

- Assisted Professors in courses like Bio materials, Composites of materials and in Computer Lab during M.Tech. in IIT Bombay.
- Teaching assistant for various characterization instruments such as **Atomic force microscopy, X-ray diffractometer, and Field emission scanning electron microscopy** in IIT Gandhinagar.
- Helped Professors in developing the **Central characterization facility** and **Thin film laboratory** in IIT Gandhinagar.
- **Mentor** for B.Tech. and M.Tech. students in conducting various academic projects in IIT Gandhinagar.

### **Publications**

#### **Journal Publications**

- **C. C. Singh**, T. A. Patel, and E. Panda, "Relation between surface and bulk electronic properties of Al doped ZnO films deposited at varying substrate temperature by radio frequency magnetron sputtering", J. Appl. Phys., 2015, **117**, 245312.
- **Chetan Singh** and Emila Panda, "Variation of electrical properties in thickening Al-doped ZnO films: role of defect chemistry", RSC Adv., 2016, **6**, 489103.
- Tvarit A. Patel\*, **Chetan C. Singh**\* and Emila Panda, "Microstructure influenced variation in the local surface electrical heterogeneity in thickening Al-doped ZnO films: evidence using both scanning tunnelling spectroscopy and conductive atomic force microscope", Mater. Sci. Semi. Proc., 2018, **75**, 65 (\* *equally contributed author*).
- **Chetan C. Singh** and Emila Panda "Zinc interstitial threshold in Al-doped ZnO film: Effect on microstructure and optoelectronic properties": J. Appl. Phys., 2018, **123**, 165106.
- **Chetan C. Singh** and Emila Panda "Effect of intrinsic electronic defect states on the morphology and optoelectronic properties of Sn-rich SnS particles" J. Appl. Phys., 2018, **123**, 174904.
- **Chetan C. Singh** and Emila Panda "Point defect influenced bulk and surface electrical properties of Sn-rich SnS films deposited by radio frequency magnetron sputtering" (*under review*).

- Vaibhav Bhavsar, Deepa Dixit, **Chetan C. Singh**, Vikram Karde, Chinmay Ghoroi, and Emila Panda “Insights into morphology and surface energy for improved optoelectronic properties of SnS nanoparticles” (*under review*).

### **Conference Presentations**

- Tvarit Patel, **Chetan Singh** and Emila Panda, “Study of nanoscale local conductance of Al-doped ZnO thin films with varying substrate temperature using Conducting probe atomic force microscopy”, in European Materials Research Society Fall meeting 2014, Warsaw, Poland, Sep. 15-19.
- **Chetan Singh**, Tvarit Patel and Emila Panda, “Relating surface and bulk electronic properties of Al-doped ZnO films deposited at varying substrate temperature by RF magnetron sputtering”, in 8<sup>th</sup> International Conference on Materials for Advanced Technology of the Materials Research Society of Singapore 2015, Suntec, Singapore, Jun. 28 - Jul. 3.
- **Chetan Singh**, Tvarit Patel and Emila Panda, “Interpreting the surface electrical heterogeneity of Al-doped ZnO films”, in the 18th International workshop on Physics of Semiconductor Devices, 2015, IISc Bangalore, India, Dec. 7-11.
- **Chetan Singh** and Emila Panda, “Understanding the origin of electrical properties in Al-doped ZnO films”, in European Materials Research Society in spring meeting, 2016, Lille, France, May 3-6.
- **Chetan Singh** and **Emila Panda**, “Shape-dependent optoelectronic properties of SnS powders through optical and scanning tunnelling spectroscopy”, in *the international conference on functional materials*, 2016, IIT Kharagpur, India, Dec. 12-14.
- **Chetan Singh** and Emila Panda, “Intrinsic defect-induced modification in morphology and optoelectronic properties for Sn-rich SnS”, in nanomaterials for the energy storage, 2018, PDP, Gandhinagar, India, Jan. 29-31.

### **Extra and Co-Curricular Activities**

- Participated in e- exhibition on Exploration of Universe Conducted by the Physics department in V.E.S. college of Arts, Science and Commerce of Mumbai University in Academic Year 2007-08
- Member of Metals and Materials Association, IIT Bombay
- Passed a Primary Course of Civil Defence organized by Maharashtra Government in April 2005
- Studied spiritual literatures and passed a course conducted by ISKCON in March 2010.

### **Other Information**

- **Instrument Knowledge:** X-ray Diffractometry (XRD), Field Emission Scanning Electron Microscope (FESEM), Energy Dispersive Spectroscopy (EDS), Atomic Force Microscope (AFM), Scanning Tunnelling Microscope/ Spectroscopy (STM/STS), Conducting Atomic force microscopy (CAFM), Electrostatic force microscopy (EFM), X-ray Photoelectron Spectroscopy (XPS), UV-Vis-NIR spectrophotometer, Hall effect measurement system (HEMS), Photoluminescence spectroscopy (PL), Transmission electron microscope (TEM), Raman spectroscopy, Universal Testing Machine (UTM), Radio frequency (RF) magnetron sputtering and Spin coating.
- **Computer Proficiency:**
  - Operating Systems: Windows
  - Document Preparation Tool: MS Office

- **Language Proficiency:** English, Hindi and Marathi.
- **Hobbies:** Reading Spiritual literature, Cooking.

## **References**

- Prof. Emila Panda  
Associate Professor  
Department of Materials Science and Engineering  
IIT Gandhinagar, Gujarat, India  
Email: emila@iitgn.ac.in
- Prof. Kabeer Jasuja  
Assistant Professor  
Department of Chemical Engineering  
IIT Gandhinagar, Gujarat, India  
Email: kabeer@iitgn.ac.in

Prof. Abhijit Mishra  
Associate Professor  
Department of Materials Science and Engineering  
IIT Gandhinagar, Gujarat, India  
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