

<b>Objective</b>	Actively seeking for a postdoc position emphasis on solid state device physics, device fabrication, characterization and electronic material processing.
<b>Summary</b>	Proficient in fabrication, characterization and analysis of semiconductor devices such as MOSFETs, flash memories, TFTs, LEDs, Solar Cells along with dielectrics: ALPO, ZrO <sub>2</sub> , TiO <sub>2</sub> , HfO <sub>2</sub> , AlHfO <sub>2</sub> , TiHfO <sub>2</sub> , ZrTiO <sub>2</sub> , PDDA and semiconductors: IGZO, IZO, In <sub>2</sub> O <sub>3</sub> , ZnO <sub>2</sub> , P3HT, MEH-PPV, CdTe-NP, HgCdTe-NP (core shell), Pt-NP, Au-NP materials processing.
<b>Positions</b>	Jan, 2018 – : <b>Staff Engineer, Device Research</b> R & D Engineering, <b>SanDisk</b> , Bangalore 560 103, Karnataka, India
<b>Education</b>	2011 – 2018 : <b>PhD</b> – Physics, Indian Institute of Science (IISc), Bangalore, India 2009 – 2011 : <b>M.S.</b> – Physics, IISc, Bangalore, India, CGPA : 6/8 ( <b>Distinction</b> ) 2004 – 2009 : <b>B.Sc.(Honours)</b> – Physics, University of Calcutta (CU), Kolkata, India
<b>Awards</b>	2017 : Foreign Travel Grant Award for USA by CSIR, Govt. of India 2016 : International Travel Award for USA by ITS, SERB, DST, Govt. of India 2011 – 2016 : Rajiv Gandhi National Fellowship by UGC, Govt. of India 2015 : International Travel Award for USA by CeNSE, IISc, Bangalore 2012 : National Eligibility Test (NET), conducted by HRD-CSIR, Govt. of India 2009 – 2011 : Integrated PhD Scholarship (2009 – 11), Dept. of Physics, IISc, India 1999 – 2008 : National Scholarship Awards, Government of India 1999 – 2000 : Science Talent Research Test by Jatiya Vigyan Parishad, India 2001 : Achievement cum Diagnostic test in Mathematics by Centre for Pedagogical Studies in Mathematics, India
<b>Leadership</b>	2015 : Chairman & Chief Coordinator of SPECTRUM 2015 – The Mega Cultural, Sports, Literary, Science & Tech Festival of IISc, Bangalore, India 2014 – 2015 : Chairman of Gymkhana (2014 – 15), IISc, Bangalore, India 2012 – 2015 : Convener of Gymnasium (2012 – 15), Gymkhana, IISc, Bangalore, India 2012 : Exam Coordinator: PH 101 (Aug–Dec) 2:1 Introductory Physics I – Mechanics, Oscillations and waves (2:1), UG, IISc, Bangalore, India 2012 – 2013 : Organizing Volunteer: KVPY VIJYOSHI Camp – 2012 (Dec 1–3) & 2013 (Dec 7–9) conducted by DST, Govt. of India at IISc, Bangalore, India
<b>Teaching</b>	2013 : ➤ TA: PH 101(Aug–Dec) 2:1 Introductory Physics I – Mechanics, oscillations and waves (2:1), Under Graduate, IISc, India ➤ TA: PH 102 (Jan–Apr) 2:1 PH 102: Introductory Physics II – Electricity, Magnetism and Optics (2:1), Under Graduate, IISc, India ➤ Student’s Project Guide (UG Level): “Quantum Dot Memory Device & Its Temperature Assay” by Diptaparna Biswas (April–July) 2012 : ➤ Teaching Assistant (TA): ESc 102 (Jan–Apr) 2:1 Introduction to Electrical and Electronics Engineering, UG, IISc, Bangalore, India 2011 : ➤ Student’s Project Guide (Post–Graduate Level): “Fabrication of Metal–Semiconductor diode and MIS Capacitor and Analysis of I–V characteristics of the Diodes” by A. Bhattacharyya & K. Sen (Aug–Dec)
<b>Membership</b>	➤ Indian Physical Society (IPS) – Life Member ➤ Indian Physics Association (IPA) – Life Member
<b>Services</b>	Reviewer : Materials Letters & Indian Journal of Pure & Applied Physics (IJPAP)
<b>Courses</b>	Semiconductor Physics and Technology, Nanoelectronics Device Fabrication and Characterization, Micromachining and MEMS Technology, Introduction to Photonic Devices, Advanced Experiments in Condensed Matter Physics, etc
<b>Skills</b>	<b>Software Proficiency :</b> C, C++, MATLAB, HTML, Mathematica, Auto CAD, CAM 350, Cle Win, Origin, Nova AFM, CasaXPS, Corel DRAW, Inkscape, LaTeX, ImageJ, Lab View, CompleteEASE and Multisim.

### **Growth & Fabrication Proficiency :**

**Growth:** Sol-gel process, Hydrothermal for nanoparticles (CdTe & core-shell, Au, Pt), Oxidation; **PVD:** Sputtering, Thermal evaporation; **Lithography:** Resists, Optical; **Etching Process:** Wet chemical; Material Modification: Implantation, Annealing, Plasma & wafer bonding.

### **Characterization Proficiency :**

HP/Keithley I-V and C-V measurement systems, High Speed CV (HSCV) measurement system. Optical Microscopes, Inverted, Fluorescence, UV), FTIR and UV Visible, LASER writer, PL measurement, Surface Profilometer, Double Sided Lithography Mask Aligner, Scanning Electron Beam (SEM, TEM), Scanning Probe Microscopy (AFM, STM).

## Research

### **Doctoral Research [PhD, Aug 2011 – Mar 2018]**

*Dissertation: Fully Solution Processed Flash Memory,*

*Thesis Advisor: Prof. V. Venkataraman, Department of Physics., IISc, Bangalore, India*

- Developed Low temperature (< 200°C) solution processed tunable flash memory device without tunnelling and blocking layer.
- Developed all inorganic fully solution processed, spin-coated CdTe nanoparticle based capacitive memory technology.
- Developed an Ultra-high speed Capacitance–Voltage (UCV) measurement technique (Electrical Instrumentation) for two terminal memory device applications.
- Developed fully solution processed inorganic precursor based spin-coated, ultra-high performance flexible floating gate flash memory TFTs.
- Discovered electronic deep trap and transport mechanism in oxide for memory application. Currently working on fabrication of non-volatile array of Memory tech.

### **Masters Project [MS, Aug 2009 – July 2011]**

*Project: Bistability (Memory) of CdTe quantum dots,*

*Project advisor: Prof. V. Venkataraman, Department of Physics., IISc, Bangalore, India*

- Growth of hydrothermal CdTe-NP and developed a new material with the mixture of CdTe QDs and ALPO for the two terminal non-volatile memory applications.
- Growth solution processes dielectrics: ALPO, ZrO<sub>2</sub>, TiO<sub>2</sub>, and HfO<sub>2</sub> and semiconductor: IGZO, IZO, In<sub>2</sub>O<sub>3</sub>, and ZnO<sub>2</sub> for fully solution processed TFT and memory applications.
- Shown the performance comparison between inorganic with organic dielectric (ALPO vs PDDA) & semiconductors (IGZO vs MEH-PPV) for nanoelectronic device applications.
- Observed the bistability on CdTe-NP and P3HT/MEH-PPV composite device.

## Patents

1. **Sandip Mondal** & V Venkataraman, A memory device comprising Aluminium oxide phosphate tunable traps,  
*Indian Patent Application no - 201741035172*
2. **Sandip Mondal**, Gopu S, Sainath Viswasarai, Swaroop Kaza, David Rozman, Alon Eyal, Jun Wan, Enhancement of Read Retry feature to counteract Cross Temperature degradation in NAND technology by modulating the read related parameters,  
*US Patent Application Filled through Western Digital*
3. **Sandip Mondal**, An Ultrafast Capacitive Voltage (UCV) System,  
*US Patent Application Filled through Western Digital*

Publications > **25 Publications** | **Citations: 121** | **h-index: 7** | **i-10 index: 5** | [Google Scholar link](#)

### **2018**

16. **Sandip Mondal** and V. Venkataraman, Annealing temperature dependent tunable charge trap states in sol-gel processed Aluminium Oxide Phosphate,  
*Nature Materials (Under Review)*
15. **Sandip Mondal** and V. Venkataraman, A Fully sol-gel processed Memory TFT,  
*Advanced Materials (Under Review)*

14. **Sandip Mondal** and V. Venkataraman, Ultra-Fast C-V (UCV) method to investigate the electronic trap spectral energy distribution, *IEEE Electron Device Lett.* (Under Review)
13. **Sandip Mondal** and V. Venkataraman, Controllable Contact Resistance Behaviour of All Solution Processed TFT in different Scale, *Applied Physics Letters* (Under Review)
12. **Sandip Mondal** and V. Venkataraman, Graphene Based High-mobility Memory-TFT, *Applied Physics Letters* (Under Review)

## 2017

11. **Sandip Mondal** and V. Venkataraman, Tunable electron affinity with electronic band alignment of solution processed dielectric, *Applied Physics Letters* 111(4), 041602(1-4) (2017)
10. Arvind Kumar, **Sandip Mondal** and K.S.R. Koteswara Rao, Experimental evidences of charge transition levels in ZrO<sub>2</sub> and at the Si: ZrO<sub>2</sub> interface by Deep Level Transient Spectroscopy, *Applied Physics Letters* 110(13), 132904 (2017)
9. Arvind Kumar, **Sandip Mondal** and K.S.R. Koteswara Rao, Tunable band alignment and dielectric constant of solution route fabricated Al/HfO<sub>2</sub>/Si gate stack for CMOS applications, *J. Appl. Phys.* 121, 085301 (2017)
8. Arvind Kumar, **Sandip Mondal** and K.S.R. Koteswara Rao, DLTS Analysis and Interface Engineering of Solution Route Fabricated Zirconia Based MIS Devices Using Plasma Treatment, *Journal of Electronic Materials* 1-6 (2017)

## 2016

7. **Sandip Mondal** and V. Venkataraman, All Inorganic Spin-coated Nanoparticle Based Capacitive Memory Devices, *IEEE Electron Device Lett.* 37(4), 396 – 399 (2016)
6. Gyanan, **Sandip Mondal** and Arvind Kumar, Tunable dielectric properties of TiO<sub>2</sub> thin film based MOS systems for application in microelectronics, *Superlatt. Microst.* 100, 876 – 885 (2016)
5. Arvind Kumar, **Sandip Mondal** and K.S.R. Koteswara Rao, Structural, electrical, band alignment and charge tapping analysis of nitrogen annealed Pt/HfO<sub>2</sub>/p-Si (100) MIS devices, *Appl. Phys. A*, 122, 1027 (2016)
4. Arvind Kumar, **Sandip Mondal** and K.S.R. Koteswara Rao, “Low temperature solution processed high-κ ZrO<sub>2</sub> gate dielectric for nanoelectronics”, *Appl. Surf. Science*, 370, 373–379 (2016)

## 2015

3. Arvind Kumar, **Sandip Mondal** and K.S.R. Koteswara Rao, Critical investigation of high performance spin-coated high-κ titania thin films based MOS capacitor, *J. Mat. Science: Mat. Elec.* 27(5), 5264–5270 (2015)
2. Arvind Kumar, **Sandip Mondal** and K.S.R. Koteswara Rao, DLTS Analysis of Amphoteric Interface Defects in High-κ TiO<sub>2</sub> MOS Structures Prepared by Sol-Gel Spin-Coating, *AIP Advances* 5, 117122 (2015)
1. A. Kumar, **S. Mondal**, S. G. Kumar and K. S. R. K. Rao, High performance sol-gel spin-coated titanium dioxide dielectric based MOS structures, *Mat. Science in Sem. Proc.* 40, 77–83 (2015)

16. **Sandip Mondal**, Fully Solution Processed Flash Memory at SanDisk India Device Design Center, Survey No.143/1 Amani Bellandur Khane Village, Varthur Hobli, Bangalore East Taluk, Bengaluru, Karnataka 560103, **India** (Sep 6, 2017)  
– **Invited Talk in SanDisk**
15. **Sandip Mondal**, Electrical Behaviour of Fully Solution Processed HfO<sub>2</sub> (MOS) in Presence of Different Light Illumination, 62<sup>th</sup> DAE Solid State Physics Symposium (SSPS) at BARC, Mumbai, **India** (Dec 26{30, 2017)  
– **Best Poster Award**
14. **Sandip Mondal** and V. Venkataraman, Tunable Traps in Solution Processed Spin-coated Aluminium Oxide Phosphate, 59<sup>th</sup> Electronic Materials Conference (EMC) at University of Notre Dame, Notre Dame, IN 46556, **USA** (June 28 –30, 2017)  
– **Oral**
13. **Sandip Mondal** and V. Venkataraman, Flash Memory TFT Based on Fully Solution Processed Oxide, 75<sup>th</sup> Device Research Conf. (DRC) at University of Notre Dame, Notre Dame, IN 46556, **USA** (June 25 –28, 2017)  
– **Oral**
12. Arvind Kumar, **Sandip Mondal** and K.S.R. Koteswara Rao, DLTS analysis and interface engineering of solution route fabricated Zirconia based MIS devices using plasma treatment, 59<sup>th</sup> Electronic Materials Conference (EMC) at University of Notre Dame, Notre Dame, IN 46556, **USA** (June 28 –30, 2017)  
– **Oral**
11. **Sandip Mondal** and V. Venkataraman, Band structure of a sol-gel spin-coated dielectric: Aluminum Oxide Phosphate, 58<sup>th</sup> Electronic Materials Conference (EMC) at University of Delaware, Newark, DE 19716, **USA** (June 22–24, 2016)  
– **Oral**
10. **Sandip Mondal** and V. Venkataraman, Fully Spin-coated Memory TFT, 74<sup>th</sup> Device Research Conf. (DRC) at University of Delaware, DE 19716, **USA** (June 19 –22, 2016)  
– **Poster**
9. Arvind Kumar, **Sandip Mondal**, K.S.R. Koteswara Rao, Interface investigation of solution processed high- $\kappa$  ZrO<sub>2</sub>/Si MOS structure by DLTS, APS March Meeting 2016 at Baltimore, Maryland, **USA** (March 14–18, 2016)  
– **Oral**
8. **Sandip Mondal**, Arvind Kumar, K.S.R. Koteswara Rao, V. Venkataraman, Highly Reliable Spin-coated Titanium Dioxide Dielectric, 60<sup>th</sup> DAE Solid State Physics Symposium (SSPS) at Amity University, Noida, UP, **India** (Dec 21–25, 2015)  
– **Poster**
7. **Sandip Mondal**, Arvind Kumar, K.S.R. Koteswara Rao, V. Venkataraman, Highly Reliable Spin-coated Low Temperature Processed Zirconium dioxide, 18<sup>th</sup> International Conf. on Phys. and Semicon. Dev. (IWPSD) at IISc, Bangalore, **India** (Dec 7–10, 2015)  
– **Poster**
6. Arvind Kumar, **Sandip Mondal**, K.S.R. Koteswara Rao, Electrical Study of Al/HfO<sub>2</sub>/p-Si (100) Gate Stack, 60<sup>th</sup> DAE Solid State Physics Symposium (SSPS) at Amity University, Noida, UP, **India** (Dec 21–25, 2015)  
– **Poster**
5. Arvind Kumar, **Sandip Mondal**, K.S.R. Koteswara Rao, Low temperature solution processed high –  $k$  ZrO<sub>2</sub> gate dielectric for nanoelectronics, 18<sup>th</sup> International Conf. on Phys. and Semicon. Dev. (IWPSD) at IISc, Bangalore, **India** (Dec 7–10, 2015)  
– **Poster**
4. Arvind Kumar, **Sandip Mondal**, K.S.R. Koteswara Rao, Zirconium doped TiO<sub>2</sub> thin films: A promising dielectric layer, International Conference on Condensed Matter and Applied Physics (ICC) at Bikaner ,Rajasthan, **India** (Oct 30–31, 2015)  
– **Poster**
3. **Sandip Mondal** and V. Venkataraman, All inorganic spin-coated nanoparticle memory device, 73<sup>rd</sup> Device Research Conference (DRC) at Ohio State University, Ohio, **USA** (June 21–24, 2015)  
– **Poster**

2. Arvind Kumar, **Sandip Mondal** and K. S. R. Koteswara Rao, *Critical investigation of spin-coated high- $k$  titania thin films based MOS capacitor*, *The 5<sup>th</sup> International Symposium on Organic and Inorganic Electronic Materials and Related Nanotechnologies (EM – NANO 2015)* at TOKI MESSE, Niigata Convention Center, Niigata, **JAPAN** (June 16 – 19, 2015)  
– **Poster**
1. Arvind Kumar, **Sandip Mondal**, and K. S. R. Koteswara Rao, *High- $\kappa$  TiO<sub>2</sub> thin film prepared by sol-gel spin-coating method*, *59<sup>th</sup> DAE Solid State Physics Symposium (SSPS)* at VIT University, Vellore, Tamilnadu, **India** (Dec. 16–20, 2014)  
– **Poster**

## References

Prof. V. Venkataraman (**PhD, Princeton**)  
**Chairman & Professor**  
Dept. of Physics, Indian Institute of Science  
Bangalore 560 012, India  
Phone: (+91) 9886798515 (Mobile Cell)  
Email: [venki@iisc.ac.in](mailto:venki@iisc.ac.in)  
Relation: *Int. PhD (MS+PhD) theses supervisor*

Prof. K. S. R. Koteswara Rao (**PhD, IISc**)  
**Professor**  
Dept. of Physics, Indian Institute of Science  
Bangalore 560 012, India  
Phone: (+91) 9731319519 (Mobile Cell)  
Email: [raoksrk@gmail.com](mailto:raoksrk@gmail.com)  
Relation: *Research Collaborator*

Prof. Ramesh Chandra Mallik (**PhD, IIT**)  
**Associate Professor**  
Dept. of Physics, Indian Institute of Science  
Bangalore 560 012, India  
Phone: (+91) 9483967785 & 9448898560  
(Mobile cell)  
Email: [rcmallik@iisc.ac.in](mailto:rcmallik@iisc.ac.in)  
Relation: *Instructor of MS Course work*

Dr. Arvind Kumar (**PhD, IISc**)  
**Assistant Professor**  
Dept. of Physics, Indira Gandhi National  
Tribal University, Lal Pur, Amarkantak,  
Madhya Pradesh 484886, India  
Phone: (+91) 9482932608 (Mobile Cell)  
Email: [arvind@igntu.ac.in](mailto:arvind@igntu.ac.in)  
Relation: *Research Collaborator*