Dr. Somaditya Sen

Associate Professor, Member of Board of Governors
Discipline of Physics, Metallurgy Engineering and Material Sciences, Centre of Astronomy
IIT INDORE, Khandwa Road, Simrol, Indore, India

EMPLOYMENT

Feb 2013	**Present**	**Indian Institute of Technology Indore, India**	**Associate Professor**
Feb'16 Aug'15	Jan'18 Feb'17	• Administration	• **Member Board of Governors** • **Associate Dean Planning**
2014	2015	• Academics	**Departmental Post Graduate Committee, MEMS** **PhD selection committee member**
2013	Present	• Research & Development	**Planner & Team Leader:** • MoU initiative with MCUT, Taipei • MoU initiative with RRCAT • Indo-French Tech Summit 2013 • Indo-US Tech Summit 2014 • India International Science Festival 2015
Mar 2013	Present	• Central Workshop • Outreach	**Head of the Department** • Internship to local college students • Social Welfare
Feb 2007	Jan 2013	University of Wisconsin Milwaukee, USA [Dept. of Physics]	Scientist/ Research Associate
Jan 2006	Jan 2007	University of Wisconsin Milwaukee, USA [Dept. of Electrical Engg.]	Research Associate
Aug 2003	Jan 2006	University of Electro-Communication, Japan [Dept. of Electronics Engg.]	Research Scientist
Jan 2003	Aug 2003	National Taiwan University, Taiwan [Centre Cond. Matter Science]	Postdoctoral Fellow
Dec 1999	Aug 2003	PPH School, Kolkata, India	Teacher
Mar 1998	Nov 1999	Indian Association for the Cultivation of Sciences, India [Solid State Physics]	Senior Research Fellow
Mar 1996	Feb 1998	Indian Association For The Cultivation of Sciences, India [Solid State Physics]	Junior Research Fellow
Jun 1995	Feb 1996	Jadavpur University, India [Electronics Engg. Dept.]	Junior Research Fellow

Research Interests:

Semiconductor oxides with bandgap in the range 2-4 eV (although has been reported vastly till date) hold major grounds which need to be explored. Keeping multi-functionality in mind, co-doping can lead to interesting physics and exotic materials with electromagnetic coupling of dielectric and magnetic properties. Such materials are probable new generation materials, with importance in the field of memory devices, spintronics, energy devices, metamaterials, dielectric resonators, etc. Simple as well as complex perovskite, spinel oxides can be chemically engineered to homogeneously substitute with compatible elements which can bring in changes in the parent lattice and electronic structure to modify optical and other physical properties. Such changes are shaping the optoelectronics of tomorrow. Facilitated with a network of collaborators spread in the US, Taiwan, Japan and India, my research interest is diversified in various fields, yet focussed on such materials. Collaborators contribute to structural and physical characterization along with fabrication of device using these materials of new chemical identity.

MATERIAL TYPES:

Magnetic Oxides Materials
Semiconducting Oxide Crystals
Semiconducting Oxide Glasses
Ferroelectrics
Multiferroics
Magnetoelectrics
Nanomaterials
Single Crystals
Thin Films

SYNTHESIS TECHNIQUES:

Sol-gel, Hydrothermal,
Co-precipitation, Solid state reaction,
Floating Zone Single crystal growth,
Melt quenching, Spin coating,
Vapour deposition, E-beam deposition,
Chemical Vapour deposition, etc.

STRUCTURAL STUDIES:

XRD, XPS, EXAFS/XANES, FESEM,
HRTEM, SAED, EDX, AFM,
Raman Spectroscopy, IR, UV-vis,
PL/PLE, Fluorescence

PHYSICAL PROPERTIES:

Magnetic Properties,
Electrical conductivity,
Dielectric Properties,
Magnetoelectric/
Magnetoferroelectric/
Magnetodielectric properties,
Specific Heat, Thermogravimetric prop,
Thermo-optical prop.

International Collaborators	**Affiliation**
Dr. Sajal Biring	Ming Chi University of Technology, Taipei, Taiwan
Prof. Chia Hao Ku	Ming Chi University of Technology, Taipei, Taiwan
Prof. Mahmud Khan	Miami University, USA
Prof. Marija Gajdardziska-Josifovska	University of Wisconsin Milwaukee, USA
Prof. Robert Klie	Univ. of Illinois at Chicago, USA
Dr. Yang Ren	Advanced Photon Source, Argonne National Lab, USA

ACADEMIC RESPONSIBILITY:

DPGC Convener of Metallurgy Engg and Materials Science Department
PSPC member of three PhD students

COURSES TAKEN:

UNDER GRADUATE	**POST GRADUATE / PhD LEVEL:**
Electrodynamics	Classical Mechanics
B.Tech Physics Laboratory	Thermodynamics
	Quantum Mechanics
	Statistical Mechanics
	MSc Electronics Lab

ADMINISTRATIVE RESPONSIBILITIES

Member of the **BOARD of GOVERNORS**, IIT INDORE (serving)
Dean Planning (Acting) of IIT Indore (2015-2016)
Building Works Committee member of RG-IIITM Gwalior (serving)

Headed IIT Indore team in:
Indo-French Tech Summit 2013, New Delhi
Indo-Australia Student Exchange Planning 2014
Indo-US Tech Summit in Nov 2014
India international Science Festival in Nov 2015

Established IITI-MCUT MoU on Research collaboration and Student exchange
Leading role to establish IITI-RRCAT MoU
Nurturing Research and Development relations with universities/industries
Setup of institutional research centres for material science and astronomy

Arranged Student RnD team to showcase IITI research to meet

- **President of India**, Mr Pranab Mukherjee,
- ex-President of India, **Dr Abdul Kalam**,
- ex-MHRD minister, **Dr Shashi Tharoor**

Major interaction with eminent scholars like,

- Bharatratna **Prof C N R Rao**
- Scientific Secretary to the Govt of India, Prof S V Raghavan,
- DST Secretary, Prof Ramasamy,
- Padmashri, Padmabhusan **Dr V K Saraswat**

Major role in academic events like convocations, seminars, conferences, public lectures and institutional reporting to ministry, etc.

PUBLICATIONS since 2015

1	Tulika Srivastava, Gaurav Bajpai, Nidhi Tiwari, D Bhattacharya, S N Jha, Sunil Kumar, Sajal Biring, Somaditya Sen, OPTO-ELECTRONIC PROPERTIES OF Zn(1-x)VxO: GREEN EMISSION ENHANCEMENT DUE TO V4+, *J. Appl. Phys. 122-3* 2017
2	Gaurav Bajpai, Tulika Srivastava, Mohd Nasir, Saurabh Tiwari, Shubhra Bajpai, EG Rini, Sajal Biring, Somaditya Sen, A comprehensive theoretical and experimental study on structural and mechanical properties of Si doped ZnO, *Scripta Materialia* , vol. 135, pp. 1-4, 2017
3	Mohd. Nasir, N. Patra, Md. A. Ahmed, D. K. Shukla, Sunil Kumar, D. Bhattacharya, C. L. Prajapat, D. M. Phase, S. N. Jha, Sajal Biring and Somaditya Sen, Role of compensating Li/Fe incorporation in Cu0.945Fe0.055xLixO: structural, vibrational and magnetic properties, *RSC Advances,* vol. 7, pp.

	31970–31979, 2017
4	Sunil Kumar, Arun Kumar Yadav, Somaditya Sen, Sol–gel synthesis and characterization of a new four-layer $K_{0.5}Gd_{0.5}Bi_4Ti_4O_{15}$ Aurivillius phase, *Journal of Materials Science: Materials in Electronics,* vol. 04 May 2017, pp. 1-10, 2017
5	Tulika Srivastava, Aswin Sadanandan, Gaurav Bajpai, Saurabh Tiwari, Ruhul Amin, Mohd. Nasir, Sunil Kumar, Parasharam M. Shirage,Sajal Biring, $Zn_{1-x}Si_xO$: Improved optical transmission and electrical conductivity, *Ceramics International* , vol. 43, pp. 5668–5673, 2017
6	Arun Kumar Yadav, Parasmani Rajput, Ohud Alshammari, Mahmud Khan, Anita, Gautham Kumar, Sunil Kumar, Parasharam M Shirage, Sajal Biring, Structural distortion, ferroelectricity and ferromagnetism in $Pb(Ti_{1-x}Fe_x)O_3$, *Journal of Alloys and Compounds,* vol. 701, pp. 619–625, 2017
7	Saurabh Tiwari, Gaurav Bajpai, Tulika Srivastava, Srashti Viswakarma, Parasharam Shirage, Somaditya Sen, Sajal Biring, Effect of strain due to Ni substitution in CeO_2 nanoparticles on optical and mechanical properties, *Scripta Materialia* , vol. 129, pp. 84-87, 2017
8	Gaurav Bajpai, Mohd Nasir, Rini E G, Pritpal Sandhu, Siddharth Malu, Sunil Kumar, Parasharam M. Shirage and Somaditya Sen, Structural and Mechanical characterization of Si doped ZnO , *Journal of Nano Science and Nanotechnology (JNN),* vol. 17, pp. 1806-1812, 2017
9	Tulika Srivastava, E.G Rini, Ashutosh Joshi, Parasharam Shirage, Somaditya Sen, Structural distortion and bandgap increment in nanocrystalline wurtzite Si-substituted ZnO, *Journal of Nanoscience and Nanotechnology,* vol. 17, pp. 1356-1359, 2017
10	Prateek Bhojane, Alfa Sharma, Manojit Pusty, Yogendra Kumar, Somaditya Sen and Parasharam Shirage, , Synthesis of Ammonia-Assisted Porous Nickel Ferrite (NiFe2O4) Nanostructures as a Electrode Material for Supercapacitors, *Journal of Nanoscience and Nanotechnology (JNN),* vol. 17, pp. 1387-1392, 2017
11	Md Nasir, Gautam Kumar, Parasharam Shirage and Somaditya Sen, Synthesis, morphology, optical and electrical properties of $Cu_{1-x}Fe_xO$ nanopowder, *Journal of Nanoscience and Nanotechnology (JNN),* vol. 17, pp. 1345-1349, 2017
12	Arun kumar Yadav, Anita, Sunil Kumar, Parasharam M. Shirage, Sajal Biring, Somaditya Sen, Structural and dielectric properties of $Pb_{(1-x)}(Na_{0.5}Sm_{0.5})_xTiO_3$ ceramics, *Journal of Materials Science,* vol. 1, pp. 1, 2017
13	Mohd Nasir, N. Patra, D. K. Shukla, D. Bhattacharya, Sunil Kumar, D. M. Phase,

	S. N. Jha, S. Biring, Parasharam M. Shirage, Somaditya Sen, X-ray structural studies on solubility of Fe substituted CuO, *RSC Advances,* vol. 6, pp. 103571–103578, 2016
14	Amit Kumar Rana , Rajasree Das, Yogendra Kumar , Somaditya Sen , Parasharam M. Shirage , Growth of transparent $Zn_{1-x}Sr_xO$ ($0.0 \leq x \leq 0.08$) films by facile wet chemical method: Effect of Sr doping on the structural, optical and sensing properties, *Applied Surface Science,* vol. 379, pp. 23–32, 2016
15	Nasima Khatun, Somaditya Sen, Magnetic and Dielectric properties of V doped TiO2 nano-particles, *Nanotechnology for better living. ,* vol. 3, pp. 170, 2016
16	Prateek Bhojane, Somaditya Sen and Parasharam Shirage, Enhanced electrochemical performance of Mesoporous NiCo2O4 as an excellent supercapacitive alternative energy storage material, *Applied Surface Science,* vol. 377, pp. 376-384, 2016
17	Nasima Khatun, E. G. Rini, Parasharam Shirage, Parasmani Rajput, S. N. Jha, Somaditya Sen, Effect of lattice distortion on bandgap decrement due to vanadium substitution in TiO2 nanoparticles Materials Science in Semiconductor Processing, *Materials Science in Semiconductor Processing,* vol. 50, pp. 7-13, 2016
18	Tulika Srivastava, Sunil Kumar, Parasharam Shirage, Somaditya Sen, Reduction of O2– related defect states related to increased bandgap in Si4+ substituted ZnO, *Scripta Materialia,* vol. 124, pp. 11–14, 2016
19	Amit Kumar Rana, Aneesh J. , Yogendra Kumar, Arjunan , K. V. Adharsh, Somaditya Sen and Parasharam Shirage, ENHANCEMENT OF TWO PHOTON ABSORPTION WITH NI DOPING IN THE DILUTE MAGNETIC SEMICONDUCTOR ZNO CRYSTALLINE NANORODS, *Applied Physics Letters,,* vol. 107 (23), pp. 231907, 2015
20	Tulika Srivastava, Parasharam Shirage and Somaditya Sen, Synthesis, Characterization & Device fabrication based on doped ZnO nanoparticle and film, *INUP, Centre for Nanoscience & Nanotechnology, IISc Bangalore,* 2015
21	Amit Kumar Rana, Yogendra Kumar, Niharika Saxena, Rajasree Das, Somaditya Sen, and Parasharam Shirage, Studies on the control of ZnO nanostructures by wet chemical method and plausible mechanism, *AIP Advances,* vol. 5, pp. 97118, 2015

22	Rajasree Das, Amit Kumar, Yogendra Kumar, Somaditya Sen and Parasharam M. Shirage, Effect of growth temperature on the optical properties of ZnO nanostructures grown by simple hydrothermal method, *RSC Advances,* vol. 5, pp. 60365, 2015
23	Yogendra Kumar, Amit rana, Prateek Bhojane, Manojit Pusty, Vivas Bagwe, Somaditya Sen, Pa1asharam M Shirage, Controlling of ZnO nanostructures by solute concentration and its effect on growth, structural and optical properties, *Materials Research Express,* vol. 2(10), pp. 105017, 2015

REFEREES:

- Prof. MARIJA GAJDARDZISKA-JOSIFOVSKA, Dean, UWM, USA; mgj@uwm.edu

HOBBIES/ LIKINGS:

Photography, Poetry, Music, Nature, Meditation, Social Work.