Resume: Dr. Ajay Soni

Dr. **Ajay Soni**
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Dr. Ajay Soni is an Assistant Professor of Physics in the School of Basic Sciences, Indian Institute of Technology Mandi, HP, India. He obtained his PhD from the UGC-DAE Consortium for Scientific Research, Indore, India, followed by postdoctoral research at NTU Singapore (2009-2011) and NUS Singapore (2011-13). He is an experimental condensed matter physicist with a focused research on understanding and manipulating the electrical and thermal transport properties in bulk, thin films, nanostructures and functional devices. His main research focus lay in exploring alternative clean energy technologies such as thermal energy harvesting using thermoelectric materials and nano-functional devices for sensor, memory and flexible electronics. He has received the Young Scientist Research Award from the DAE-BRNS, Department of Atomic Energy, India, and a Young faculty start up grant from the Department of Science and Technology, India. Dr. Soni is also recipient of Bhaskara advanced solar energy research fellowship (BASE) funded by Indo-US science and technology forum. His efforts give an impetus to the make in India and clean energy campaign.

Professional Activity: Reviewer for Journal of Americal Chemical Society, Nano Letters, Nature Scientific Reports, Applied Surface Science, Carbon, Nano Energy, Chemical Physics Letters, Energy and Environmental Science, Journal of Materials Chemistry (A, C), RSC Advances, Nanoscale, Journal of Physical Chemistry, Applied Optics, Journal of Physics and Physical Chemistry, Materials Horizons
Reviewer for DST-SERB project proposal for funding, NTU Singapore TIER-1 proposals.

Guest Editor (Journal of Nanomaterials), Special Issue on Nanomaterial Synthesis, Characterization and Applications

Professional Experience: (2009-2013)

- **2013 Onwards** :Asst. Prof., School of Basic Sciences, IIT Mandi
- **2011-2013:** Department of Physics, National University of Singapore, Singapore
- **2009-2011**: Nanyang Technological University, Singapore
- **2003-2004**: Lecturer (Physics) Govt. College, Nimbahera, Chittorgarh, Raj. India
- **2002-2003**: Lecturer (Physics) Govt. College, Mandphia, Chittorgarh, Raj. India

Research Project and Awards

- Bhaskara Advanced Solar Energy Research Fellowship-BASE Fellow-2018.
- Young Scientist Research Award by BRNS, India;
- Young Scientist Start Up Grant, by Science and Engineering Research Board (SERB), Delhi,
- Executive Board member of Society for Interdisciplinary Research in Materials and Biology.
- UGC-CSIR National Eligibility Test, India (June 2002)
- Position in M. L. S. University merit for M.Sc. (Physics) 2001

Student recognitions:

1. Niraj Singh won best poster award in conference on physics of strongly correlated system 2018.
2. Mahesh Soni won best poster award in conference on spectroscopy of functional nanomaterials 2017.
3. Juhi Pandey won best technical presentation award in international conference on materials and biology at IIT BHU, Feb 2017.

Patents:

- One Step, Low Temperature, Cost Effective, Photo-Chemical Reduction of Graphene Oxide Dispersions for the Commercial Scale Analogous Reduced Graphene Oxide (αr-GO) Production, Mahesh Soni, Pawan Kumar, S. K. Sharma and Ajay Soni,
  Patent Application Number 201611028125, Publication Date 02/09/2016.

Publications

1. *Coupling of charge carriers with magnetic entropy for power factor enhancement in Mn doped $Sn_{1.03}Te$ for thermoelectric applications*, Somnath Acharya, Sharmistha Anwar, Takao Mori and Ajay Soni, ***J. Mater. Chem. C*** 6 (24), 6489 (2018).
2. Integration of Graphene Oxide Buffer Layer/Graphene Floating Gate for Wide Memory Window in Pt/Ti/Al_2O_3/GO/graphene/SiO_2/p-Si/Au Non-Volatile (FLASH) Applications, Mahesh Soni, Ajay Soni, S. K. Sharma, ***Applied Physics Letters***, 112, 252102 (2018).
3. *Charge Carriers Modulation and Thermoelectric Performance of Intrinsically p-Type Bi_2Te_3 by Ge Doping,* Niraj Singh, Juhi Pandey, Somnath Acharya and Ajay Soni, ***Journal of Alloys and Compounds****, 746, 350 (2018).*
4. *Scalable and site specific functionalization of reduced graphene oxide for circuit elements and flexible electronics,* Mahesh Soni, Pawan Kumar, Juhi Pandey, Satinder K. Sharma and Ajay Soni, ***Carbon*** *128, 172 (2018).*

5. *Nitrogen doped multilayer photo catalytically reduced graphene oxide floating gate: Al/PMMA/NrGO/SiO2/p–Si/Au based hybrid gate stack for novolatile memory applications*, Mahesh Soni, Ajay Soni, S. K. Sharma, ***Organic Electronics*** *51, 48-53, (2017),*
6. *Reduction of the thermal conductivity of the thermoelectric material ScN by Nb alloying, Nina Tureson, Ngo Van Nong, Daniele Fournier, Niraj Singh, Somnath Acharya, Susann Schmidt, Laurent Belliard, Ajay Soni, Arnaud le Febvrier, and Per Eklund,* ***Journal of Applied Physics*** *122, 025116, (2017),*
7. *Photo-catalytic reduction of oxygenated graphene dispersions for supercapacitor applications, Mahesh Soni, Pawan Kumar, Rudra Kumar, S. K. Sharma Ajay Soni,* ***Journal of Physics D: Applied Physics*** *50, 124003, (2017) ,*
8. *Selective Detection of F— Using Al Microarrays Integrated Graphene Oxide,* Mahesh Soni, Pawan Kumar, Ajay Soni and S. K. Sharma, ***Sensors and Actuators B: Chemical****, (2017) ,*
9. *Soft phonon modes driven reduced thermal conductivity in self-compensated Sn1.03Te with Mn doping,* Somnath Acharya, Juhi Pandey and Ajay Soni, ***Appl. Phys. Lett.*** *109, 133904 (2016).*
10. *Integration of Highly Sensitive Oxygenated Graphene With Aluminum Micro-Interdigitated Electrode Array Based Molecular Sensor for Detection of Aqueous Fluoride Anions,* Mahesh Soni, Tarun Arora, Robin Khosla, Pawan Kumar, Ajay Soni and S. K. Sharma, ***IEEE Sensors Journal*** *16 (6) 1524 (2016) ,*
11. *Nanomaterial Synthesis, Characterization, and Application: Editorial,* Mahmood Ghoranneviss, Ajay Soni, Alireza Talebitaher and Necdet Aslan, ***Journal of Nanomaterials***, 892542 (2015)
12. *Dual Gate Tunable and High Responsivity Graphene-Based Field Effect Transistors,* Mahesh Soni, S. K. Sharma, and Ajay Soni ***Macromolecular Symposia, Soft Materials***, 357 (1) 12 (2015) ,
13. *Interface driven thermoelectric power of spark plasma sintered nanoplatelet composites of* $Bi_2Te_{2.7}Se_{0.3}$, **Ajay Soni,** S. Yiqiang, Y. Ming, Z. Yanyuan, Y. Ligen, H. Xiao, Z. Dong, M. K. K. Aik, M. S. Dresselhaus and Xiong Qihua, ***Nano Letters*** *12 (8) 4305 (2012)*
14. *Enhanced Thermoelectric Properties of Solution Grown* $Bi_2Te_{3-x}Se_x$ *Nanoplatelet Composites,* **Ajay Soni**, Y. Zhao, Y. Ligen, M. K. K. Aik, M. S. Dresselhaus and Xiong Qihua, ***Nano Letters*** 12(3), 1203 (2012)
15. *Effect of Co-doping on the resistivity and thermopower of* $SmFe_{1-x}Co_xAsO$ $(0.0 \leq x \leq 0.3)$*, G. S. Okram, N. Kaurav,* ***Ajay Soni****, A. Pal, and V. P. S. Awana, AIP Advances* ***2****, 042137 (2012)*
16. *Raman Spectroscopy of Few-Quintuple Layer Topological Insulator* Bi_2Se_3 *Nanoplatelets,* Z. Jun, P. Zeping, **Ajay Soni**, P. Bo, Y. Zhao, J. Wang, M. S. Dresselhaus, and Q. Xiong, ***Nano Letters*** 11 (6), 2407–2414 (2011).
17. *Magneto-resistance, thermal conductivity, thermo-electric power and specific heat of superconductor Gd0.95Pr0.05Ba2Cu2.94M0.06O7-[delta] (M=Fe, Ni, Zn and Mn),* T.

Chakraborty, B. Gahtori, **Ajay Soni**, G. S. Okram, S. K. Agrawal, S. Y. Chen, Y. K. Kuo, M. A. H. Ahsan, Ashok Rao, *Solid State Communications*, 151(17), 1117-1121 (2011).

18. *High Coercive Field and Magnetization Reversal in Core-shell Cum Nanotwin Driven Ni/NiO Nanospheres*, G. S. Okram, **Ajay Soni**, D. T. Adroja, N. P. Lalla, and T. Shripathi *J. Nanosci. Nanotechnol.* **11**, 2632-2635 (2011).
19. *The pH-controlled particle size tuning of nanocrystalline Ni in polyol synthesis method without additional cappant*, G. S. Okram, **Ajay Soni** and R. Prasad, *Adv. Sci. Lett.*, **4**, 132–135 (2011).
20. *Electrical and thermal properties of bulk superconductors* $Eu_{0.95}Pr_{0.05}Ba_2(Cu_{1-x}M_x)_3O_{7-\delta}$ *(M=Fe, Ni, Zn and Mn),* T. Chakraborty, B. Gahtori, **Ajay Soni**, G. S. Okram, S. K. Agarwal, Y.-S. Chen, Y.-K. Kuo, Geetha, A. Rao, C. K. Sarkar, *Physica C: Superconductivity*, 470, 244 (2010).
21. *Negative thermopower of over doped* $Bi_2Sr_2CaCu_2O_8$ *superconductor*, J. K. Bains, M. Mudgel, G. S. Okram, **Ajay Soni**, V. P. S. Awana, P. K. Ahluwalia, R. B. Saxena, H. Kishan, *Physica C: Superconductivity*, 470, S203 (2010).
22. *The unusual electrical response in polyaniline - threonine composites*, T. Mathavan, S. Umapathy, M.A. Jothirajan, M. Fatima Parveen, T.S. Vivekanandam, **Ajay Soni**, G. S. Okram, V. Ganesan, Materials Letters 64, 2009 (2010).
23. *Effect of Mn substitution on the thermo-power of the superconductor* $Mg_{1-x}Mn_xB_2$, A. Rao, T. Chakraborty, B. Gahtori, C. Sarkar, S. K. Agarwal, **Ajay Soni**, G. S. Okram, Journal of Physics: Conference Series 234, 012033 (2010).
24. *Size dependent thermopower in nanocrystalline nickel*, **Ajay Soni** and G. S. Okram, ***Appl. Phys. Lett***. 95, 013101 (2009). (***Virt. J. Sci. Technol. 20th July 2009***).
25. *Anomalous Thermoelectric power of over-doped* $Bi_2Sr_2CaCu_2O_8$ *superconductor*, V. P. S. Awana, J. K. Bains, G. S. Okram, **Ajay Soni** and H. Kishan, *J. Appl. Phys.* 106, 096102 (2009).
26. *Electrical properties of polyaniline doped with metal ions*, J. B. M. Krishna, A. Saha, G. S. Okram, **Ajay Soni**, S. Purakayastha and B. Ghosh, *J. Phys. D: Appl. Phys.* 42, 095404 (2009).
27. *Resistivity and thermopower measurement set-ups in the temperature range of 5-325 K*, **Ajay Soni** and G. S. Okram, ***Rev. Sci. Instru***. 79, 125103 (2008).
28. *Anomalous electrical transport in nanocrystalline nickel*, G. S. Okram, **Ajay Soni** and R. Rawat, ***Nanotechnology***, 19, 185711 (2008).
29. *Grain size effect on lattice of Ni nanocrystals prepared through polyol method*, G. S. Okram, K. N. Devi, H. Sanatombi, **Ajay Soni**, V. Ganesan and D. M. Phase, *J. Nanosci. Nanotech.* 8, 4127 (2008).
30. *Thickness dependent structural, electronic and optical properties of Ge- nanostructures*, S. Tripathi, R. Brajpuriya, A. Sharma, **Ajay Soni**, G. S. Okram, S. M. Chaudhari and T. Shripathi, *J. Nanosci. Nanotech* 8, 2955 (2008).

31. *Low temperature electrical resistivity of cupric telluride thin films*, K. Neyvasagam, N. Soundararajan, **Ajay Soni**, G. S. Okram, and V. Ganesan, *Phys. Stat. Solid. (b)* 245, 77 (2008).
32. *Sonochemical Synthesis of Poly (Methyl Acrylate)*, M. A. J. Rajan, T. Mathavan, T. S. Vivekanandam, S. Umapathy, V. Ganesan, G. S. Okram and **Ajay Soni**, *Sol. Sta. Phenom.*, 136, 175 (2008).
33. *Ammoximation of Cyclohexanone over nanoporous TS-1 using UHP as an Oxidant*, S. Saxena, J. Basak, N. Hardia, R. Dixit, S. Bhadauria, R. Dwivedi, R. Prasad, **Ajay Soni**, G. S. Okram, and Ajay Gupta, *Chem. Eng. J.* 132, 61 (2007).

Invited Talks:

1. Understanding and Manipulating Charge Transport Properties of Chalcogenide Thermoelectric, Materials Science Seminar, Materials Research Center, Rensselaer Polytechnic Institute, Troy, New York, USA, June 20th, 2018.
2. Thermoelectric Performance through Band Modification and Phonon Engineering in Doped SnTe, Somnath Acharya, JuhiPandey and Ajay Soni, Invited talk in India-UK workshop on Thermoelectric Materials for Waste-Heat Harvesting, Organized by The Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR, India) and the University of Reading (UK), January 8-10, 2018.
3. Structural Complexities and Confinement Effects in Layered Materials at Extreme Nanoscale, Ajay Soni, Invited talk for Material Science Group Seminar, IGCAR, Kalpakkam, TN, January 2, 2018.
4. State of the Art Thermoelectric Materials for Heat Energy Conversion, Ajay Soni, Invited talk in National Conference on Recent Trends in Experimental and Theoretical Physics (NCRTETP - 2017), SS University, Palampur, November 23-24, 2017.
5. Graphene Derivatives at Nanoscale and Applications, **Ajay Soni**, Invited talk in Conference on "Sepctroscopy of Emerging Functional Materials" (SEFM-2017), School of Basic Sciences, Indian Institute of Technology Mandi, October 9-10, 2017.
6. Structural Complexities and Confinement Effects in Layered Materials at Nanoscale, **Ajay Soni**, Invited talk in National Conference on "Physics at Small Scales and Advanced Materials" (PSAM-2017), School of Physics, University of Hyderabad, September 8-9, 2017.
7. Role of Structural Defects and Soft Phonon Modes in Doped Tin Telluride for Thermoelectric Applications, **Ajay Soni**, Invited talk in International Conference on Materials for Advanced Technologies (ICMAT -2017), Symposium DD-02: Chalcogenide based materials innovations for Thermoelectrics I , June 19-23, 2017.
8. Structural Intricacies in Chalcogenide Materials: Causes and Effects on Thermoelectric Properties, **Ajay Soni**, Invited talk in National Symposium on Technologically Advanced Functional Materials (NSTAFM-2017), Central University of Rajasthan, Kishangarh, Rajasthan, March 16-17, 2017.

9. Confinement Effects and Phonon Modes in Layered Chalcogenides at Extreme Nanoscale, **Ajay Soni**, Invited talk in International Conference on "Advances in Biological Systems and Materials Science in NanoWorld" (ABSMSNW-2017), IIT BHU, UP, Feb 19-23, 2017.
10. Soft Phonon Modes and Structural Defects in Thermoelectric Materials for Heat Energy Conversion, **Ajay Soni**, Invited talk in 2nd International Conference on Soft Materials (ICSM-2016), MNIT Jaipur, December 12-16, 2016.
11. Structural Complexity and Phonons in Thermoelectric Materials, **Ajay Soni**, Invited talk in International Conference of Young Researchers on Advanced Materials (IUMRS-ICYRAM 2016), IISc Bangalore, December 11-15, 2016.
12. Interfaces and defects in bulk thermoelectric nanocomposites of layered chalcogenides, **Ajay Soni**, Invited Talk in Energy materials Nanotechnology (EMN 2016), Prague, Czech Republic, During June 21-24, 2016.
13. Thermoelectric Power Enhancement in Bulk-Composite of Doped Chalcogenides, Somnath Acharya and **Ajay Soni**, European Materials Research Society Spring Meeting, Lille, France, during May 2-6, 2016.
14. Light-Matter Interaction in Monolayers of Semiconducting Transition Metal Di-Chalcogenides, Juhi Pandey and **Ajay Soni**, Frontiers in Light-Matter Interaction 2016, at Indian Institute of Technology Ropar, Rupnagar, Punjab, during March 4-5, 2016.
15. Improved Thermoelectric Performance in Manganese Doped Tin Telluride, Somnath Acharya and **Ajay Soni**, International Conference on Materials Science & Technology (ICMTech - 2016), University of Delhi, during 01 - 04 March, 2016.
16. Thermoelectric Performance of Bulk Composites of 2D Nanoplatelet, **Ajay Soni**, Invited talk in "Recent Trends in Thermoelectric Materials: Fundamentals to Applications", 2nd Indo-US workshop on Thermoelectrics, during December 15-17, 2014 at National Physical Laboratory, New Delhi.
17. Dual Gate Tunable and High Responsivity Graphene Based Field Effect Transistor, Mahesh Soni, Satinder Kumar Sharma, **Ajay Soni,** International Conference on Soft Materials-ICSM2014, during 06-10 October, 2014, held at MNIT, Jaipur, India.
18. Role of Interfaces in Thermoelectric Performance of Bulk Nanocomposites**, Ajay Soni** and Q. Xiong, Invited talk in International Union of Materials Research Society, International Conference in Asia - 2013 (IUMRS-ICA 2013), December 16-21st, 2013, held at IISc Bangalore, India.