Dr. Manjusha Battabyal, Ph.D.

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Employment History

2016 – · · · · **Scientist,** Centre for Automotive Energy Materials, ARCI, India.

2012 – 2016 **DST Scientist.** IIT Madras, Chennai and ARCI-Chennai, India.

2010 – 2012 **Collaborator Scientist.** Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland.

2009 – 2010 **Postdoctoral Scientist.** Chalmers University of Technology, Sweden.

2006 – 2008 **Postdoctoral Fellow.** Swiss Federal Laboratory for Materials Technology under ETH domain (EMPA), Switzerland, India.

Education

2002 – 2006 **Ph.D., IIT Kharagpur** Cryogenic Engineering.
Thesis title: *Electrical and thermal transport in silver doped lanthanum manganite.*

2000 – 2002 **DCA. Computer Science, PAT Education, Odisha** .

1998 – 2000 **M.Sc. Physics, Utkal University, Odisha**.
Solid State Physics.

1995 – 1998 **B.Sc. Science, MPC College, Utkal University, Odisha** .
Physics (major), Chemistry, Mathematics (minor).

Research Interest

Materials Both Structural and functional materials, such as heat-sink materials, plasma facing materials, thermoelectric materials, magnetic materials.

Processing technology Powder metallurgy, solid-state synthesis, chemical synthesis, infiltration technique

Characterization XRD, SEM, TEM, APT, XPS

Physical properties Electrical conductivity, thermopower, thermal conductivity, magnetic properties

Device fabrication Thermoelectric device, sensors

Teaching Solid state physics, Mathematical physics

Miscellaneous Experience

Awards and Achievements

2015-2020 **Reviewer Recognition Award**, Elsevier Publishing Group.

2016 **Scopus Best Cited Researcher Award**.

2002 **Doctoral Fellowship granted by IIT Kharagpur, India**.

2001 **Qualified Graduate Aptitude Test in Engineering (GATE)-secured within top 5%**.

2000 **Qualified JEST** .

1998 **Gold Medalist and received four gold medals**. Topper in BSc among all disciplines, Utkal University, India.

Miscellaneous Experience (continued)

1993-2000 — **National fellowship by MHRD, India** .

Students supervision

PhD Students — **Vikrant Trivedi (2018-ongoing), Minati Tiadi (2019-ongoing)**

Master Students — **Four (completed)**

BTech Students — **Two, (completed)**

Sponsored Projects

As PI — Development and optimization of W based materials for plasma facing applications granted by Department of Science and Technology (DST), India.

As Co-PI — Development and implementation of micro- and nanoscale (granulated) semiconductor thermoelectric materials, Indo-Uzbekistan bilateral project, sponsored by DST, India.

Industry

Industry partner — M/S Prayogik Technologies Pvt Ltd for skutterudite thermoelectric materials and modules

Sponsored projects — Worked on sponsored projects from Plansee, Austria and Volvo Aerocorporation, Sweden

Membership

Life time member — Electron Microscopy Society of India

Membership — International Thermoelectric Society

Language skill

Fluent — English, Hindi, Odia, Bengali

Research Publications

Peer reviewed journal articles, h-index=15, (∗ indicates the corresponding author)

1. Das, A., Chauhan, A., Trivedi, V., Tiadi, M., Kumar, R., **Battabyal, Manjusha**∗, & Satapathy, D. K. (2021). Effect of iodine doping on the electrical, thermal and mechanical properties of snse for thermoelectric applications. *Physical Chemistry Chemical Physics, in press*.

2. Trivedi, V., **Battabyal, Manjusha**∗, Perumal, S., Chauhan, A., Satapathy, D. K., Murty, B. S., & Gopalan, R. (2021). Effect of refractory tantalum metal filling on the microstructure and thermoelectric properties of co4sb12 skutterudites. *ACS Omega, in press*.

3. **Battabyal, Manjusha**∗, Karthiselva, N. S., Rajesh, P., & Gopalan, R. (2020). Pressure induced enhancement in the thermoelectric and mechanical properties of ni-doped skutterudites during spark plasma sintering. *Materials Research Innovations*, 1–6.

4. Konda, K., Moodakare, S. B., Kumar, P. L., **Battabyal, Manjusha**, Seth, J. R., Juvekar, V. A., & Gopalan, R. (2020). Comprehensive effort on electrode slurry preparation for better electrochemical performance of lifepo4 battery. *Journal of Power Sources, 480*, 228837.

5. Balasubramanian, P., **Battabyal, Manjusha**∗, Das, D., Bose, A. C., & Gopalan, R. (2019). Tuning of mg content to enhance the thermoelectric properties in binary mg2+ δsi (δ= 0, 0.1, 0.15, 0.2). *Materials Research Express, 6*(12), 125519.

6. Kumar, A., **Battabyal, Manjusha**, Chauhan, A., Suresh, G., Gopalan, R., Satapathy, D. K. et al. (2019). Charge transport mechanism and thermoelectric behavior in te:(pedot: Pss) polymer composites. *Materials Research Express*, *6*(11), 115302.

7. Muthamilselvam, K., Mayarani, M., Muralikrishna, G. M., **Battabyal, Manjusha***, & Gopalan, R. (2019). Tuning the optical and thermoelectric properties of srtio. 8- x sno. 2fexo3. *Materials Research Express*, *6*(4), 045905.

8. **Battabyal, Manjusha***, Balasubramanian, P., Geethu, P., Pradipkanti, L., Satapathy, D. K., & Gopalan, R. (2018). Tailoring the optical phonon modes and dielectric properties of nanocrystalline srtio3 via yb doping. *Materials Research Express*, *5*(4), 046301.

9. Trivedi, V., **Battabyal, Manjusha***, Balasubramanian, P., Muralikrishna, G. M., Jain, P. K., & Gopalan, R. (2018). Microstructure and doping effect on the enhancement of the thermoelectric properties of ni doped dy filled cosb 3 skutterudites. *Sustainable Energy & Fuels*, *2*(12), 2687–2697.

10. Balasubramanian, P., **Battabyal, Manjusha***, Sivaprahasam, D., & Gopalan, R. (2016). On the formation of phases and their influence on the thermal stability and thermoelectric properties of nanostructured zinc antimonide. *Journal of Physics D: Applied Physics*, *50*(1), 015602.

11. **Battabyal, Manjusha***, Priyadarshini, B., Pradipkanti, L., Satapathy, D. K., & Gopalan, R. (2016). Phase stability and lattice thermal conductivity reduction in cosb3 skutterudites, doped with chalcogen atoms. *AIP Advances*, *6*(7), 075308.

12. Gopalan, R., & **Battabyal, Manjusha**. (2016). Nanostructured thermoelectric materials for automotive waste heat recovery. *Nanotech insight*, 1–11.

13. Harish, S., Sivaprahasam, D., **Battabyal, Manjusha**, & Gopalan, R. (2016). Phase stability and thermoelectric properties of cu10. 5zn1. 5sb4s13 tetrahedrite. *Journal of Alloys and Compounds*, *667*, 323–328.

14. **Battabyal, Manjusha***, Priyadarshini, B., Sivaprahasam, D., Karthiselva, N., & Gopalan, R. (2015). The effect of cu2o nanoparticle dispersion on the thermoelectric properties of n-type skutterudites. *Journal of Physics D: Applied Physics*, *48*(45), 455309. doi:10.1007/s10579-013-9253-0

15. Veleva, L., Schaeublin, R., **Battabyal, Manjusha***, Plociski, T., & Baluc, N. (2015). Investigation of microstructure and mechanical properties of w–y and w–y2o3 materials fabricated by powder metallurgy method. *International Journal of Refractory Metals and Hard Materials*, *50*, 210–216.

16. **Battabyal, Manjusha***, Spätig, P., Murty, B., & Baluc, N. (2014). Investigation of microstructure and microhardness of pure w and w-2y2o3 materials before and after ion-irradiation. *International Journal of Refractory Metals and Hard Materials*, *46*, 168–172.

17. **Battabyal, Manjusha***, Schäublin, R., Spätig, P., Walter, M., Rieth, M., & Baluc, N. (2013). Microstructure and mechanical properties of a w–2wt.% y2o3 composite produced by sintering and hot forging. *Journal of Nuclear Materials*, *442*(1-3), S225–S228.

18. **Battabyal, Manjusha***, Spätig, P., & Baluc, N. (2013). Effect of ion-irradiation on the microstructure and microhardness of the w-2y2o3 composite materials fabricated by sintering and hot forging. *Fusion Engineering and Design*, *88*(9-10), 1668–1672.

19. Rieth, M., Dudarev, S. L., De Vicente, S. G., Aktaa, J., Ahlgren, T., Antusch, S., … Barthe, M.-F. et al. (2013). Recent progress in research on tungsten materials for nuclear fusion applications in europe. *Journal of Nuclear Materials*, *432*(1-3), 482–500.

20. Rieth, M., Dudarev, S., De Vicente, S. G., Aktaa, J., Ahlgren, T., Antusch, S., … Barthe, M.-F. et al. (2013). A brief summary of the progress on the efda tungsten materials program. *Journal of Nuclear Materials*, *442*(1-3), S173–S180.

21. Wurster, S., Baluc, N., **Battabyal, Manjusha**, Crosby, T., Du, J., Garcıa-Rosales, C., … Kurishita, H. et al. (2013). Recent progress in r&d on tungsten alloys for divertor structural and plasma facing materials. *Journal of Nuclear Materials*, *442*(1-3), S181–S189.

22. **Battabyal, Manjusha***, Schäublin, R., Spätig, P., & Baluc, N. (2012). W–2 wt.% y2o3 composite: Microstructure and mechanical properties. *Materials Science and Engineering: A*, *538*, 53–57.

23. **Battabyal, Manjusha***, Tran, M., Spaetig, P., Baluc, N., Veleva, L. et al. (2012). Development of w based materials for fusion power reactors.

24. **Battabyal, Manjusha**, Klement, U., Norell, M., Goutier, S., & Markocsan, N. (2011). Comparison of microstructure in ni-al single splats and millimeter sized drops. *Surface Modification Technologies XXV*, 3–12.

25. Ishizaki, K., **Battabyal, Manjusha***, Pittini, Y. Y., Nicula, R., & Vaucher, S. (2010). Microwave sintering explored by x-ray microtomography.

26. Klement, U., Hollang, L., Dey, S. R., **Battabyal, Manjusha**, Mishin, O. V., & Skrotzki, W. (2010). Effect of annealing on microstructural development and grain orientation in electrodeposited ni. *160*, 235–240.

27. **Battabyal, Manjusha***, Beffort, O., Kleiner, S., Vaucher, S., & Rohr, L. (2008). Heat transport across the metal–diamond interface. *Diamond and related materials*, *17*(7-10), 1438–1442.

28. **Battabyal, Manjusha**, & Dey, T. (2007). Electrical resistivity and magneto-resistance of la 0.7 sr 0.3-x ag x mno 3 pellets between 10 and 450 k. *International Journal of Modern Physics B*, *21*(05), 707–722.

29. **Battabyal, Manjusha**, & Dey, T. (2006). Thermal and electronic transport in lao. 7sro. 3- xagxmno3 compounds between 50 and 450 k. *Physica B: Condensed Matter*, *373*(1), 46–53.

30. **Battabyal, Manjusha**, & Dey, T. (2005a). Electrical conductivity in la1- xagxmno3 pellets between 10 and 350 k. *Physica B: Condensed Matter*, *367*(1-4), 40–47.

31. **Battabyal, Manjusha**, & Dey, T. (2005b). Low temperature thermoelectric properties of silver doped lanthanum maganites. *Indian J Cryogenics*, *29*.

32. **Battabyal, Manjusha**, & Dey, T. (2005c). Seebeck coefficient in polycrystalline lao. 7sro.3- xagxmno3 pellets: Analysis in terms of a phase separation model. *Journal of Physics: Condensed Matter*, *18*(2), 493.

33. **Battabyal, Manjusha**, & Dey, T. K. (2004). Low temperature electrical transport in ag substituted lamno3 polycrystalline pellets prepared by a pyrophoric method. *Solid state communications*, *131*(5), 337–342.

34. **Battabyal, Manjusha**, & Dey, T. (2004). Thermal conductivity of silver doped lanthanum manganites between 10 and 300 k. *Journal of Physics and Chemistry of Solids*, *65*(11), 1895–1900.

35. **Battabyal, Manjusha**, Ray, A., & Dey, T. (2003). Magneto-transport studies in yttrium doped lanthanum manganites between 10-300k.

Conference and invited speaker

Conference proceedings-11, Invited speaker-9