

## SCIENTIST/OFFICERS BIO-DATA

a. NAME:

**Dr. Manjusha Battabyal**

b. QUALIFICATION:

**Ph. D , Cryogenic Engineering**

c. DESIGNATION:

**Senior Scientist (Level-II)**

d. CONTACT INFORMATION:

CENTRE FOR AUTOMOTIVE ENERGY MATERIALS, ARCI, IITM RESEARCH PARK,  
TARMANI, CHENNAI 600 0113. Ph. +044 66632817 email: [manjusha.battabyal@gmail.com](mailto:manjusha.battabyal@gmail.com)

e. EXPERIENCE:

<b>Senior Scientist (Level-II)</b>	<b>September 2016-on going</b>	<b>Centre for Automotive Energy Materials (CAEM), ARCI, IITM Research Park, Chennai</b>	<b>Thermoelectric Materials for Automotive Applications and Device Fabrication</b>
<b>Middle level Scientist</b>	<b>Feb 2016- August 2016</b>	<b>Centre for Automotive Energy Materials (CAEM), ARCI, IITM Research Park, Chennai</b>	<b>Thermoelectric Materials for Automotive Applications and Device Fabrication</b>
<b>DST Scientist</b>	<b>2013-2015</b>	<b>Centre for Automotive Energy Materials (CAEM), ARCI,</b>	<b>Thermoelectric Materials for Automotive Applications and Device Fabrication</b>

		<b>IITM Research Park, Chennai</b>	
<b>Collaborator Scientist</b>	<b>2010-2012</b>	<b>EPFL, Switzerland</b>	<b>Processing, Microstructure and Mechanical Properties of W based Composites for the First Wall Component in Future Fusion Power Reactor</b>
<b>Post-Doctoral Scientist</b>	<b>2009-2010</b>	<b>Chalmers University of Technology, Sweden</b>	<b>Microstructure and Microhardness Studies in Thermal Sprayed Ni-Al Bond Coat Materials</b>
<b>Post-Doctoral Fellow</b>	<b>2006-2008</b>	<b>Swiss Federal Laboratory for Materials Technology, EMPA, Switzerland</b>	<b>Development and Optimization of Metal-Diamond Composites for Heat Sink Applications</b>
<b>Ph. D</b>	<b>2002 – 2006</b>	<b>Indian Institute of Technology, Kharagpur</b>	<b>Electrical and Thermal Transport on Silver Doped Lanthanum Manganites</b>

#### **f. RESEARCH AREA OF INTEREST**

Powder Metallurgy, Squeeze Casting, SPS and HIPping, Thermoelectric Materials and Device Fabrication, High Temperature Materials, Transmission Electron Microscopy, Thermophysical Properties, Mechanical Testing,

#### **g. LIST OF PUBLICATIONS (\* = Corresponding/first author)**

1. **Manjusha Battabyal\***, B Priyadarshini, Geethu Krishnan, L Pradipkanti, Dillip K Satapathy, Raghavan Gopalan, Mater. Res. Express, 5 (2018) 046301.
2. Priyadarshini Balasubramanian, **Manjusha Battabyal\***, Duraiswamy Sivaprahasam, Raghavan Gopalan, J. Phys. D: Appl. Phys, 50, (2017) 015602.
3. **M. Battabyal\***, R. Gopalan, Nanostructured Thermoelectric Materials for Waste Heat Recovery, Nanotech Insight 7&8 (2016) 11-16.

4. **M. Battabyal\***, B. Priyadarshini, L. Pradipkanti, Dillip K Satapathy and R. Gopalan, Phase stability and lattice thermal conductivity reduction in CoSb<sub>3</sub> skutterudites, doped with chalcogen atoms, *Aip Advances* 6 (2016) 075308.
5. H. Subramaniam, D. Sivaprahasam, **M. Battabyal** , R. Gopalan, Phase stability and thermoelectric properties of Cu 10.5 Zn 1.5 Sb 4 S 13 tetrahedrite, *J. Alloys. Comp.*, 667 (2016) 323.
6. **M. Battabyal\***, B. Priyadarshini, D. Sivaprahasam, N S. Karthiselva, R. Gopalan, The effect of Cu<sub>2</sub>O nanoparticle dispersion on the thermoelectric properties of n-type skutterudites, *J. Phys. D: Appl. Phys.*, 48 (2015) 455309.
7. L. Veleva, R. Schaeublin, **M. Battabyal\***, T. Plociski, N. Baluc, Investigation of microstructure and mechanical properties of W-Y and W-Y<sub>2</sub>O<sub>3</sub> materials fabricated by powder metallurgy metho, *Int. J Refractory Metals and Hard Materials*, **50**, 210 (2015).
8. **M. Battabyal\***, P. Spätig, B. S. Murty, N. Baluc, Investigation of microstructure and microhardness of pure W and W-2wt.%Y<sub>2</sub>O<sub>3</sub> materials before and after ion-irradiation, *Int. J Refractory Metals and Hard Materials*, **46**, 168 (2014).
9. **M. Battabyal\***, P. Spätig, N. Baluc, Effect of ion-irradiation on the micostructure and microhardness of the W-2wt.%Y<sub>2</sub>O<sub>3</sub> composite materials fabricated by sintering and hot forging, *Fusion Engg and Design*, **88**, 1668 (2013).
10. M. Rieth , S. L. Dudarev , S. M. Gonzalez de Vicente , T. Ahlgren, S. Antusch, N. Baluc, M. Balden, M.-F. Barthe, **M. Battabyal**, et al, Review of the EFDA programme on W materials, *Journal of Nuclear Material*, **442**, S173 (2013).
11. S. Wurster, N. Baluc, **M. Battabyal**, T. Crosby, J. Du, C. Garcia Rosales, A. Hasegawa, A. Hoffmann, A. Kimura, H. Kurishita, R.J. Kurtz, H. Li, S. Noh, J. Reiser, J. Riesch, M. Rieth, W. Setyawan, M. Walter, J.-H. You, R. Pippan, Recent progress in R&D on tungsten alloys for divertor structural and plasma facing materials, *Journal of Nuclear Material*, **442**, S181 (2013).
12. **M. Battabyal\***, R. Schäublin, P. Spätig, M. Walter, M. Rieth, N. Baluc ,  
MICROSTRUCTURE AND MECHANICAL PROPERTIES OF A W-2wt.%Y<sub>2</sub>O<sub>3</sub>  
COMPOSITE PRODUCED BY SINTERING AND HOT FORGING, *Journal of Nuclear Material*, **442**, S225 (2013).
13. M. Rieth , S. L. Dudarev , S. M. Gonzalez de Vicente , T. Ahlgren, S. Antusch, N. Baluc, M. Balden, M.-F. Barthe, **M. Battabyal**, et al, Recent progress on tungsten materials research for nuclear fusion applications in Europe, *Journal of Nuclear Material*, **432**, 482 (2013).
14. **M. Battabyal\***, P. Spätig, L. Veleva, N. Baluc, M. Q. Tran, 'Development of W based materials for fusion power reactors', proceedings of the 24th Fusion Energy Conference (2012), San Diego, USA, p1-p7.

15. **M. Battabyal\***, R. Schäublin, P. Spätig, N. Baluc, W-2wt.% Y2O3 COMPOSITE: MICROSTRUCTURE AND MECHANICAL PROPERTIES, Materials Science and Engineering A **538**, 53 (2012).
16. **Battabyal Manjusha**, Klement Uta, Norell Mats, Goutier Simon, Markocsan Nicolaie, 'Comparison of microstructure in Ni-Al single splats and millimeter sized droplets' proceedings of the 25th International Conference on Surface Modification Technologies', University West in Trollhättan, Sweden, SMT25 2011, p3-p12.
17. U. Klement, L. Hollang, S.R. Dey, **M. Battabyal**, O. V. Mishin, W. Skrotzki, Effect of annealing on texture development and grain orientation in electrodeposited Ni, Solid State Phenomena **160**, 235 (2010).
18. Kotaro Ishizaki, **Manjusha Battabyal**, Yoko Yamada Pitini, Radu Nicula and Sebastien Vaucher, Microwave Sintering Explored by X-Ray Microtomography, Ceramic Transactions **209**, 211 (2010).
19. **M. Battabyal\***, O. Beort, S. Kleiner, S. Vaucher and L. Rohr, Heat conduction across metal-diamond interface, Dia. Rel. Mater. **17**, 1438 (2008).
20. **Manjusha Battabyal\*** and T. K. Dey, Electrical resistivity and magneto-resistance of  $\text{La}_{0.7}\text{Sr}_{0.3-x}\text{Ag}_x\text{MnO}_3$  pellets between 10 and 450K, Int. J. Mod. Phys. B. **21**, 707-722 (2007).
21. **Manjusha Battabyal\*** and T. K. Dey, Thermal and electronic transport in  $\text{La}_{0.7}\text{Sr}_{0.3-x}\text{Ag}_x\text{MnO}_3$  compounds, Physica B **373**, 46-53 (2006).
22. **Manjusha Battabyal\*** and T. K. Dey, Seebeck coefficient in polycrystalline  $\text{La}_{0.7}\text{Sr}_{0.3-x}\text{Ag}_x\text{MnO}_3$  pellets: analysis in terms of a phase separation model, J. Phys :Condensed Matter **18**, 493-505 (2006).
23. **Manjusha Battabyal\*** and T. K. Dey, Electrical conductivity in  $\text{La}_{1-x}\text{Ag}_x\text{MnO}_3$  pellets between 10 and 350K, Physica B **367**, 40-47(2005).
24. **Manjusha Battabyal\*** and T. K. Dey, Low temperature thermoelectric properties of silver doped lanthanum manganites, Indian Journal of Cryogenics, (2005).
25. **M. Battabyal\*** and T. K. Dey, Thermal conductivity of silver doped lanthanum manganites between 10 and 300K, J. Phys. and Chem. Solids, **65**, 1895 (2004).

26. **Manjusha Battabyal\*** and T. K. Dey, Low temperature electrical transport in Ag substituted  $\text{LaMnO}_3$  polycrystalline pellets prepared by a pyrophoric method, Solid State Commum. **131**, 337 (2004).

27. **M. Battabyal\*** and T. K. Dey 'Low temperature electrical resistivity in  $\text{La}_{0.7}\text{Sr}_{0.3-x}\text{Ag}_x\text{MnO}_3$  pellets at cryogenic temperatures' Proceedings of the International Symposium on Advanced Materials And Processing (2004), held at Material Science Center in IIT Kharagpur, India.

28. **M. Battabyal\***, A. Ray and T. K. Dey, Magneto-transport studies in Yttrium doped Lanthanum manganites between 10-300K, Indian Journal of Pure and Applied Physics **41**, 443 (2003).

#### **h. Invited lectures delivered**

1. **Manjusha Battabyal\***, Vikrant Trivedi, Priyadarshini Balasubramanian, B. Jayachandran, D. Sivaprahasam, Raghavan Gopalan, High efficient thermoelectric materials and thermoelectricmodules for waste heat recovery, 5<sup>th</sup> ICNN-2018, Feb 8-10, 2018, held at VIT, Chennai, India
2. **Manjusha Battabyal\***, Vikrant Trivedi, B. and Raghavan Gopalan, Enhanced Thermoelectric Properties in Ni doped  $\text{CoSb}_3$  Skutterudites Processed by Spark Plasma Sintering, 2<sup>nd</sup> Indo-UK workshop on Thermoelectric materials for waste heat recovery, Jan 8-10, 2018 held at JNCASR, Bangalore, India
3. **Manjusha Battabyal\***, Work shop on "Advanced Automotive Materials" at College of Engineering, Anna University, Chennai, 16<sup>th</sup> Feb, 2016.
4. **M. Battabyal\***, B. Priyadarshini, D. Sivaprahasam, R. Gopalan, Enhancement of thermoelectric properties in Ni doped  $\text{Co}_4\text{Sb}_{12}\text{Te}_{0.1}$  skutterudites, ICFMST-2015, Dec 10-12, 2015 held at NIST, Berhampur, Orissa, India.

#### **i. Conference Attended: 30 nos**

#### **j. AWARDS AND HONORS**

1. Gold-medalist, received four gold medals for securing first position in the university

(among 1500 students) during Bachelors Degree in physics.

2. Qualified in the prestigious national level Graduate Aptitude Test for Engineering (GATE)-2001, conducted by Indian Institute of Technologies. AIR-71.
3. Doctoral fellowship granted by Indian Institute of Technology, Kharagpur (2002-2006).
4. National scholarship granted by Dept. of Education, Govt. of India, during undergraduate study (1993-2000).

#### **j.PHOTOGRAPH**



#### **k. Affiliation to Professional Societies**

1. Associate Member of Indian Institute of Metals.
2. Associate Member for Swiss Society of Optics and Microscopy.