

## Lavanya Raman

Research scholar  
Indian Institute of Technology Madras  
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### Education

<b>B.E</b>	2008-12	Metallurgical Engineering	PSG College of Technology, Coimbatore, India	8.87/10
<b>M.Tech &amp; PhD</b>	2013 to Present	Metallurgical & Materials Engineering	Indian Institute of Technology Madras, Chennai, India	9.34/10

### Research description

Recently, American Air Force Research Laboratory (AFRL) has utilized the concept of high entropy alloys (HEAs) to develop refractory HEAs as potential material for high temperature applications. Most of the work on refractory HEAs has been done on the cast alloys to understand the microstructure and phase evolution. Few reports deal with the room temperature and high temperature testing. But very scarce report is available on the mechanism of the deformation behaviour of these alloys. Thus, there exists a large gap and window of opportunity to improve the understanding on refractory HEAs in terms of the alloy composition, deformation behaviour, strength and ductility, oxidation resistance and creep resistance. The present work attempts to make nanocrystalline refractory HEA through mechanical alloying and study the deformation behaviour.

### Research experience

Synthesis, characterization and deformation of refractory multicomponent alloys (2014-Present)

- Developing nanocrystalline and cast multicomponent alloys for high temperature applications
- Understanding deformation behaviour of refractory multicomponent alloys
- Characterization using XRD, SEM and TEM

Grain growth kinetics of austenitic oxide dispersion strengthened steels (2012-2013)

- Synthesis and characterization of nanocrystalline austenitic oxide dispersion strengthened steels
- Evaluation of activation energy for grain growth

Characterization of Ni<sub>60</sub>Al<sub>40</sub> developed by mechanical alloying and spark plasma sintering (2012)

- Characterization of the sintered pellet using XRD, SEM and TEM
- Evaluating properties like hardness, compressive yield strength at room temperature

### Publications

- Lavanya Raman, Karthick Gothandapani and B.S. Murty, "Austenitic Oxide Dispersion Strengthened Steels: A Review, Defence science journal 66(4) (2016) 316-322

### Awards

Received student grant at International Conference on processing & manufacturing of advanced materials (THERMEC 2018), Paris, 08-13 July 2018

### Conference presentations

- Lavanya R, S.V.S. Narayana Murty, Ravi Sankar Kottada, B.S.Murty, Alloying and deformation behaviour of nanocrystalline multicomponent equiatomic refractory alloys synthesised through mechanical alloying, International Conference on processing & manufacturing of advanced materials (THERMEC 2018), Paris, 08-13 July 2018
- Lavanya R, Hot Compression Behavior of Refractory High Entropy Alloy, In-House Symposium (IHS), IIT Madras, India, 29 - 30 July 2017
- Lavanya R, S.V.S. Narayana Murty, Ravi Sankar Kottada, B.S.Murty, Hot deformation behaviour of a refractory high entropy alloy, International Workshop on High Entropy Materials (IWHEM-2017), UoH and IIT Hyderabad, 11-12 March 2017
- Lavanya R, Renuka Gudhe, S.V.S. Narayana Murty, Ravi Sankar Kottada, B.S.Murty, Synthesis, Phase Evolution and Mechanical Property Study on CrMoNbTiW Refractory High Entropy Alloy, International Symposium for Research Scholars (ISRS), IIT Madras, 21 Dec - 23 December 2016
- Lavanya R, S.V.S. Narayana Murty, Ravi Sankar Kottada, B.S.Murty, Mechanical Behaviour of CrMoNbTiW Refractory High Entropy Alloy, International Conference on High Entropy Materials (ICHEM), Taiwan, 06-09 November 2016
- Lavanya R, Geeta Kumari, S.V.S. Narayana Murty, Ravi Sankar Kottada, B.S.Murty, Synthesis, Phase Evolution and Mechanical Property study on Refractory High Entropy Alloy, In-House Symposium (IHS), IIT Madras, India, 27 - 28 January 2016
- Lavanya R, B.S.Murty, Grain growth kinetics of Austenitic ODS Steels, National Metallurgist Day – Annual Technical Meeting 2014, College of Engineering Pune, 12-15 November 2014

### Experimental Skill Proficiency

Hands-on experience on operating

- Fritsch P5 high energy ball mills
- Spark Plasma Sintering machine(Dr Sinter SPS 5000, Japan)
- X-ray Diffractometer (X'pert Pro- PANalytical)
- Scanning Electron microscope (FEI-Quanta 400 and Inspect-F)
- Transmission Electron microscope (Philips CM12, FEI TECHNAI 12)
- High Temperature UTM (Z100 Zwick)
- GLEEBLE 3800 Thermomechanical simulator

### Other Academic Research Oriented Responsibilities

- Supervised seven summer interns (2013-2018)
- Student in-charge, XRD facility, Nano Lab, Dept Metallurgical and Materials Engineering, IIT Madras (2012 – 2014).
- Teaching assistant for graduate course “Practical TEM” (July-Nov 2015 to Dec 2017).
- Teaching assistant for undergraduate course “Mechanical Testing Lab” (Jan-May 2017).
- Teaching assistant for an undergraduate student “Introduction to Metallurgical and Materials Engineering” (Jan-May 2017)

### Extra-curricular activities

- **Organizer** for Paper and Poster session, **Amalgam** (Tech-fest), Dept of MME, IIT Madras (2017)
- **Core member** of **Amalgam** (Tech-fest), Dept of MME, IIT Madras (2017)

- **Student secretary** for MetSA, Department MME student association, 2016-2017
- **Student secretary** for conference "In-house Symposium (**IHS-2016**), IIT Madras"
- Student organizer for **BramPrakash quiz** for school students (11<sup>th</sup> and 12<sup>th</sup>), Dept MME, IIT Madras (2015)

### Graduate Courses

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| <ul style="list-style-type: none"> <li>• Advanced Phase Transformations</li> <li>• Mechanical Behaviour of Materials</li> <li>• Introduction to Multi-Scale Modelling of Materials</li> <li>• X-ray Diffraction Techniques</li> </ul>  | <ul style="list-style-type: none"> <li>• Physical Ceramics</li> <li>• Welding Metallurgy</li> <li>• Topics in Nanomaterials</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Texture in Materials</li> <li>• Deformation &amp; Failure of Materials at elevated temperature</li> <li>• Modern Techniques of Material characterization</li> <li>• Principles and Techniques of Transmission Electron Microscopy</li> <li>• Electron diffraction and Microscopy</li> </ul> | <ul style="list-style-type: none"> <li>• Advanced materials characterization lab</li> <li>• Welding lab</li> <li>• Sheet Metal Forming</li> <li>• Corrosion Engineering</li> <li>• Practical Transmission electron microscopy</li> <li>• Structure and properties of grain boundaries and interfaces</li> </ul> |

### **References:**

1. Dr B.S. Murty  
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2. Dr Ravi Sankar Kottada  
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