

# PRAGNA BHASKAR

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## BACKGROUND

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Materials engineering professional with 7 years' experience in materials processing and characterization using X-ray Diffraction and Electron Microscopy.

## EDUCATION

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<b>Georgia Institute of Technology, Atlanta</b> PhD, Materials Science and Engineering	May '22 (expected) GPA: 3.5/4.0
<b>Indian Institute of Technology Madras, India</b> Master of Technology, Metallurgical and Materials Engineering	May'10 GPA: 9.37/10
<b>National Institute of Technology Tiruchirappalli, India</b> Bachelor of Technology, Metallurgical and Materials Engineering	May'08 GPA: 8.36/10

## SKILLS

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<b>Processing</b>	Plasma Electrolytic Oxidation, Mechanical alloying, Spark Plasma Sintering, Cryo-rolling
<b>Characterization</b>	Optical Microscopy, Scanning Electron Microscopy (SEM), Electron Back Scattered Diffraction (EBSD), Transmission Electron Microscopy (TEM), X-ray Diffraction (XRD)
<b>Testing</b>	Hardness testing, Tensile testing, Fatigue testing, Non-destructive testing, Three phase corrosion test
<b>Computer languages</b>	C, C++, C#
<b>Software &amp; tools</b>	MATLAB

## RELEVANT COURSES

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<b>PhD</b>	Thermodynamics, Structure of Materials, Fatigue, Fracture Mechanics, TEM, Scattering theory
<b>M.Tech</b>	XRD, Materials Characterization, Surface Engineering, Advanced Engineering Materials, Mechanical Behavior of Materials
<b>B.Tech</b>	Physical Metallurgy, Welding, Electrical Electronic & Magnetic Materials, Transport Phenomena, Microelectronics Processing

## WORK EXPERIENCE

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**Scientific Officer, Indira Gandhi Center for Atomic Research, Kalpakkam** **Sep' 10- Jul' 17**  
As the member of Physical Metallurgy Group, the role involved familiarizing with microstructural characterization techniques and applying the techniques to study candidate structural materials for future reactors or in reprocessing application. The results from various studies were published in peer reviewed journals, internal reports and presented at conferences. Other activities involved setting up a mechanical alloying facility, site preparation for installation of electron microscopes and mentoring a student for a short project.

### Objectives and Key Deliverables

#### Synthesis and characterization of cryo-rolled Ti alloy

The Ti-Ta-Nb alloy is a candidate material for dissolver application in nuclear fuel reprocessing. The objective of this study was to explore the possibility of using severe plastic deformation to improve strengths by grain refinement while retaining the corrosion resistance. This would potentially reduce the material volume exposed to active environment.

- Cryo-rolled Ti alloy to different percentages: 20%, 50%, 65%, 85%, 90%
- Characterized cryo-rolled alloy by XRD, SEM, TEM
- Measured the tensile properties of cryo-rolled Ti alloy
- Observed the presence of intermediate Hall-Petch regime by carrying out Hall-Petch analysis
- Performed 3-phase corrosion test and observed that the corrosion resistance of the ultra-fine-grained material had not lowered because of the grain reduction
- Comparison of the microtextures of cryo-rolled material with room temperature rolled material

**Calculating dislocation densities in Fe-ZrO<sub>2</sub> nanocomposites synthesized by mechanical alloying:** While Y<sub>2</sub>O<sub>3</sub> is the most used dispersoid in oxide dispersion strengthened (ODS) steels, it amorphizes during mechanical alloying. The objective was to explore alternative dispersoids such as ZrO<sub>2</sub> and study its behavior as a function of milling time.

- Calculated dislocation density from XRD data

**Microstructural characterization of Alloy 617 subjected to different aging conditions:** Alloy 617 is a candidate piping material for high temperature fossil fuel power plants. The objective was to investigate the degradation of fracture resistance of Alloy 617 after aging treatment at 1023 K (750 °C) for different durations up to 10,000 hours

- Carried out the TEM analysis of the alloy at different aging durations.

## RESEARCH EXPERIENCE

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**Graduate Research Assistant, Georgia Institute of Technology** **Aug'17-Present**  
**3D Systems Packaging Research Centre** **May'20-Present**  
**Fatigue crack initiation mechanisms in 316L stainless steel** **Aug'17-Apr'20**

**M.Tech Research project, IIT Madras** **Aug' 09-May' 10**

### **Synthesis and characterization of Austenitic Oxide Dispersion Strengthened (ODS) steels**

The objective of this project was to explore the possibility of ODS steel as an alternative to austenitic stainless steel (D9) as a structural material in future fast reactors and to study the role of  $Y_2O_3$  as a dispersoid.

#### **Key Deliverables**

- Synthesized Fe-Cr-Ni-xC-yTi-z $Y_2O_3$  powder using high energy ball mill
- Analyzed phases and measured crystallite sizes of powder using XRD
- Characterized powder morphology using SEM
- Optimized spark plasma sintering parameters to consolidate powder
- Achieved greater than 90% density in sintered compacts
- Microstructural characterization of compacts using XRD, SEM and TEM
- Measured hardness, tensile and compressive properties of compacts

**B.Tech Research project, NIT Tiruchirappalli** **Jan'08-May'08**

### **Optimization of Plasma Electrolytic Oxidation process**

The objective of this project was to optimize the process parameters of plasma electrolytic oxidation process on aluminum alloy to get a surface coating of optimum thickness, roughness and corrosion resistance. Design of Experiments was used in the optimization process. Corrosion resistance was measured by potentiodynamic polarization.

## PUBLICATIONS

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1. **Pragna Bhaskar**, Arup Dasgupta, V. Subramanya Sarma, U. Kamachi Mudali, S. Saroja Mechanical properties and corrosion behaviour of nanocrystalline Ti-5Ta-1.8Nb alloy produced by cryo-rolling, Materials Science & Engineering A 616 (2014) 71-77
2. K. G. Raghavendra, Arup Dasgupta, **Pragna Bhaskar**, K. Jayasankar, C. N. Athreya, Padmalochan Panda, S. Saroja, V. Subramanya Sarma, R. Ramaseshan, Synthesis and characterization of Fe-15 wt.% ZrO<sub>2</sub> nanocomposite powders by mechanical milling, Powder Technology 287 (2016) 190-200
3. Aditya Narayan Singh, A.Moitra, **Pragna Bhaskar**, G. Sasikala, Arup Dasgupta, A. K. Bhaduri, Effect of thermal aging on microstructure, hardness, tensile and impact properties of Alloy 617, Material Science & Engineering A 710 (2018) 47-56

## CONFERENCE PRESENTATIONS

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1. Oral presentation: **Pragna Bhaskar\***, Joysurya Basu, Arup Dasgupta, S. Saroja, "Quantification of Negative Cs – corrected high resolution images of cryo-rolled Ti-Ta-Nb alloy", The XXXIII Annual meeting of the Electron Microscopy Society of India, July 2-4, 2012.
2. Poster presentation: **Pragna Bhaskar\***, Arup Dasgupta, V. Subramanya Sarma, U. Kamachi Mudali, S. Saroja, "Study of Mechanical and Corrosion Resistance Properties of Cryo-mechanically Processed Ultra-Fine-Grain Structured Ti Alloy", 24th Annual General Meeting of Materials Research Society of India (MRSI), February 11-13, 2013
3. Poster presentation: **Pragna Bhaskar\***, Arup Dasgupta, S. Saroja, S. Murugesan, "Comparison of Microtexture Evolution During Cryo and Room Temperature Rolling of Ti-5Ta-2Nb Alloy", Creep-Fatigue Interaction -7, Kalpakkam, January 21-23, 2016

## ACTIVITIES

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1. Member – Indian Institute of Metals (IIM), Electron Microscopy Society of India (EMSI)
  2. Volunteer – Fourth International Conference on Solidification Science and Processing (ICSSP4)
  3. Volunteer – Asha For Education, Atlanta Chapter
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