Karthik Guda Vishnu

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PROFILE

- Doctorate in materials science and engineering with 4 years of experience in predictive materials modeling from first principles
- Strong background in **Ab initio methods, molecular dynamics, crystallography, phase transformations and reaction kinetics**
- Experience in handling massively parallel codes and involvement in scientific software development

EDUCATION

- **Doctorate of Philosophy: Materials Science and Engineering** May 2012
  Purdue University, West Lafayette, Indiana, USA
  Dissertation topic: Shape memory in nanostructured metallic alloys
  Advisor: Prof. Alejandro Strachan

- **Bachelor of Technology in Metallurgical and Materials Engineering** May 2007
  National Institute of Technology, Tiruchirappalli, India

PUBLICATIONS AND CONFERENCE PRESENTATIONS

- **Karthik Guda Vishnu** and Alejandro Strachan, **Phase stability and transformations in NiTi from density functional theory calculations**, Acta Materialia, 58, 2010, 745 – 52
- **Karthik Guda Vishnu** and Alejandro Strachan, **Size effects in NiTi from density functional theory calculations** (Physical Review B, 2012, in press)
- **Karthik Guda Vishnu,** Cherukura MJ, Kim H and Alejandro Strachan, **Amorphous Ni/Al nano-scale laminates as high energy intermolecular reactive composites** (accepted, Physical Review B, 2012)
- **Karthik Guda Vishnu** and Alejandro Strachan, **Tunable thermoelastic shape-memory alloys via hetero-epitaxial integration** (to be submitted to PRL)
- Cherukura MJ, **Karthik Guda Vishnu** and Alejandro Strachan, **Kinetics of intermolecular reactive composites** (in preparation)
- **Karthik Guda Vishnu** and Alejandro Strachan, **Phase stability and transformation paths in NiTi from DFT calculations**, TMS Annual Meeting and Exhibition, February 2010, Seattle, Washington, USA
- **Karthik Guda Vishnu** and Alejandro Strachan, **Tunable shape-memory alloys via hetero-epitaxial integration, a molecular dynamics study**, International Symposium on Plasticity 2012, January 2012, San Juan, Puerto Rico
- Cherukura MJ, **Karthik Guda Vishnu** and Alejandro Strachan, **Kinetics of intermolecular reactive composites,** TMS Annual Meeting and Exhibition, March 2012, Orlando, Florida, USA

SKILLS

- Programming/scripting languages: Python
- Density functional theory codes: Quantum espresso, Seqquest, Abinit
- Molecular dynamics codes: Large-scale atomic/molecular massively parallel simulator (LAMMPS)
- Technical software packages: Mathematica, ABAQUS, AutoCAD, MATLAB

RESEARCH EXPERIENCE

Graduate Research Assistant August 2007 –present

School of Materials Engineering, Purdue University

- Characterized the various crystalline phases and transformation paths between them in NiTi using density functional theory
- Predicted a new iso-morphous phase transformation in NiTi
- Modeled relative phase stability at nano-scale in NiTi using density functional theory to explain how surfaces limit the martensitic transformation thereby shape memory behavior
- Proposed design guidelines based on epitaxial integration of Ni-rich NiAl shape memory alloys to tune thermal hysteresis and transformation temperatures for greater mechanical actuation and higher efficiency in devices
- Modeled and characterized the exothermic reactions in amorphous and crystalline inter molecular reactive composites (Ni/Al nano-laminates) to study their kinetics and energetics

Summer Intern May - July, 2005

Department of Materials Engineering, Indian Institute of Science

- Studied and optimized various parameters affecting the stability of nano-zirconia colloids using various dispersants

COURSE PROJECTS

- Stress analysis of equi-channel angular pressing (ECAP) of Aluminum and copper
- Phase field simulation of isothermal solidification of a single component system

TEACHING EXPERIENCE

Graduate Teaching Assistant Fall 2007, Spring 2011

School of Materials Engineering, Purdue University

- Conducted **Structure and properties of materials laboratory** for undergraduate students
- **Lectured, created grading rubric and graded exams and home works** for the course Mechanical Behavior of Materials

ACHIEVEMENTS & AFFILIATIONS

- Secured **All India Rank 18** in Graduate Aptitude Test in Engineering (GATE) 2007, An All India examination for graduate studies
- Member of TMS, The American Ceramic Society, American Physical Society and ASM International

REFERENCES

- Prof. Alejandro Strachan
  School of Materials Engineering, Purdue University
  Email: strachan@purdue.edu

- Prof. David Johnson (Doctoral committee member)
  School of Materials Engineering, Purdue University
  Email: davidjoh@purdue.edu

- Prof. Kevin Trumble (Doctoral committee member)
  School of Materials Engineering, Purdue University
  Email: driscol@ecn.purdue.edu

PERSONAL INFORMATION

- Visa Status: F-1 VISA
- Date of Birth: 12th April, 1986
- Country of citizenship: India