Cem Topbasi

Ph.D. Candidate in Materials Science and Engineering

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HIGHLIGHTS OF QUALIFICATIONS

- Specialized in materials for fission and fusion reactors, ion-solid interactions, and characterization of irradiation-induced microstructure by advanced electron microscopy techniques.

- Experience in alloy production, characterization and modification techniques such as transmission electron microscopy, heavy ion irradiation, X-ray diffraction, scanning electron microscopy, thermal analysis, magnetic property measurements, arc melting, heat treatments, electro-polishing, and metallography.

EDUCATION AND RESEARCH

Ph.D. Candidate in Materials Science and Engineering, The Pennsylvania State University, PA, USA (Expected graduation: May 2014).

- **Thesis:** Investigation of the fundamental mechanisms of irradiation-induced microstructure evolution of steels for next generation nuclear energy systems using in situ TEM irradiation technique (GPA: 3.94 /4.00).

M.S. in Metallurgical and Materials Engineering, Middle East Technical University, Ankara, Turkey (2008).

- **Thesis:** Investigation of the effect of alloy composition and aging on the structural and magnetic properties of Ni-Mn-Ga and Ni-Mn-Al alloys for magnetic shape memory and magnetic refrigeration applications (GPA: 3.80 /4.00).

B.S. in Physics Engineering, Ankara University, Ankara, Turkey (2005). (GPA**:** 3.40 /4.00)

PROFESSIONAL EXPERIENCE

Aug 2008 – Present: Research Assistant (Materials for Nuclear Power Group, Materials Science and Engineering Department, The Pennsylvania State University, PA, USA)

- **Project (Oct 2010- Present):** "Microstructure and Property Evolution in Advanced Cladding and Duct Materials Under Long-Term and Elevated Temperature Irradiation: Modeling and Simulation" (Sponsor: Department of Energy - Nuclear Energy University Program)

- **Project (Aug 2008- May 2011):** "Cladding and Structural Materials for Advanced Nuclear Energy Systems" (Sponsor: Department of Energy)

    - The in-service degradation of reactor core materials is related to underlying changes in the irradiated microstructure. During reactor operation, structural components and cladding experience displacement of atoms by collisions with neutrons at temperatures at which the radiation-induced defects are mobile, leading to microstructure evolution under irradiation that can degrade material properties. The projects listed above aim to understand the development of microstructural and micro-chemical features (loops, voids, precipitates, and segregation) under high temperature and high dose radiation, including the effect of differences in the initial material composition and microstructure.

Aug 2006– Aug 2008: Research Assistant (Middle East Technical University, Metallurgical and Materials Engineering Department, Ankara, Turkey).

- **Project (Aug 2006- Aug 2008):** Development of Magnetic Materials for Civil Applications-1: Magnetic Refrigerators (2006-2009) State Planning Organization (DPT).Magnetic Refrigeration, Funding Agency: State Planning Agency of Turkey.

    - Magnetic refrigeration (MR) is a promising alternative for the conventional compressor based refrigeration in use today. MR is based on the magnetocaloric effect which is described as the change in the temperature of a material due to the application of a magnetic field. The most important part of the MR unit is the magnetic refrigerant material which determines the viability of proposed system. This project aimed to investigate the effect of composition and aging on the magnetic and structural properties of Ni-Mn based alloys, which are candidate magnetic refrigerant materials.

SKILLS

- Experimental: In situ transmission electron microscopy, heavy ion irradiation, X-ray diffraction, scanning electron microscopy, vibrating sample magnetometer, differential scanning calorimetry, electro-polishing, heat treatments, arc melting, metallography.

- Engineering Software: Matlab, Mathematica.

- Programming: Fortran, C++

JOURNAL PAPERS

- **Cem Topbasi**, Arthur T. Motta, Mark A. Kirk, "In Situ Study of Heavy Ion Induced Radiation Damage in NF616 (P92) Alloy" Journal of Nuclear Materials, Volume 425, Issues 1–3, June 2012, Pages 48-53.

ORAL PRESENTATIONS

- **Cem Topbasi**, Arthur T. Motta, Mark A. Kirk, "Development of Radiation Damage in Advanced Steels Using in Situ Ion Irradiation" Materials Research Society Fall Meeting; November 2012, Boston, MA, USA.

- **Cem Topbasi**, Arthur T. Motta, Mark A. Kirk, "In Situ TEM Study of Heavy Ion Induced Microstructural Evolution in NF616 (P92) Alloy", NuMat 2012: The Nuclear Materials Conference; October 2012, Osaka, Japan.

- **Cem Topbasi**, Arthur T. Motta, Mark A. Kirk, "In Situ Transmission Electron Microscopy Investigation of Microstructural Evolution in Complex Ferritic-Martensitic Steels Under Ion Irradiation", The Second Workshop on the Use of In Situ TEM/ Ion Accelerator Techniques in the study of Radiation Damage in Solids; June 2011, Albuquerque, New Mexico.

- **Cem Topbasi**, Arthur T. Motta, Mark A. Kirk, "In Situ Investigation of Microstructure Evolution in NF616 and HCM12A Alloys under Heavy Ion Irradiation", TMS Annual Meeting & Exhibition; February 2011, San Diego, California, USA.

- **Cem Topbasi**, Arthur T. Motta, Mark A. Kirk, "In Situ Study of Radiation Damage in Advanced Ferritic-Martensitic Alloys for Gen IV Reactors", The Nuclear Materials Conference; October 2010, Karlsruhe, Germany.

- **Cem Topbasi**, M. Vedat Akdeniz and Amdulla O. Mekhrabov, "Effect of Aging on the Magnetic Behavior of Magnetic Shape Memory Ni-Mn-Al Heusler

Alloys", Materials Research Society Fall Meeting; December 2008, Boston, MA, USA.

POSTER PRESENTATIONS

- **Cem Topbasi**, Arthur T. Motta, Mark A. Kirk, "Microstructure Evolution of Advanced Ferritic- Martensitic Steels under 1 MeV Kr Irradiation", 15th International Conference on Fusion Reactor Materials,ICFRM-15; October 2011, Charleston, South Carolina.

- **Cem Topbasi**, Djamel Kaoumi, Arthur T. Motta, "In-Situ Study of Radiation Damage in Ferritic-Martensitic Alloys for Gen IV Reactors" , Nuclear Power: Back on the Table; October 2009, University Park, Pennsylvania.

- **Cem Topbasi**, Amdulla O. Mekhrabov, M. Vedat Akdeniz, "Prediction of Order-Order and Order- Disorder Transition Temperatures in A2BC- Type Full Heusler Alloys", 14th International Metallurgy & Materials Congress; October 2008, Istanbul, Turkey.

AWARDS

- Outstanding Talk award at The Minerals, Metals & Materials Society (TMS) 2011 Annual Meeting and Exhibition with the talk, entitled "In situ investigation of microstructure evolution in NF616 and HCM12A alloys under heavy ion irradiation," presented as part of the Microstructural Processes in Irradiated Materials (MPIM) symposium, under the technical theme of Advanced Characterization, Modeling and Materials Performance.

- Second place at the Materials Science and Engineering Graduate Research Poster Competition held at the Pennsylvania State University in April, 2011.

- International Travel Grants in 2010 and 2012 at the Department of Materials Science and Engineering at the Pennsylvania State University.

EXTRACURRICULAR ACTIVITY

- Member of the Professional Development Committee in the Graduate Student Association at Pennsylvania State University which organized panels where graduate students provided information about their grad school experience and answered questions addressed by undergraduate students.