

Educational Seminar Series

Sponsored by the Peoria Chapter of ASM



Tuesday, October 20, 2009

12:00 – 4:30

11:30-12:00 Registration

30 min Break with Refreshments will be provided



Strengthening of Materials through Microstructural Modification

Professor Satya Shivkumar, Worcester Polytechnic Institute

Date: Tuesday, October 20, 2009

Location: Marty Theater Auditorium in Bradley (Michel) Student Center,
Bradley University (see attached map)

General admission is \$5, free admission for students. Non-ASM members are welcome.

Parking is available off-campus (free) and on-campus (2 options):

\$0.25 – whole day parking at the visitor's parking (*limited availability*)

\$1 reserved parking at the Parking Deck (*must notify Bob in advance*) – guaranteed parking

To register, please contact Bob Bierman at 309-494-2588 or Bierman_Bob@cat.com.

Please direct all questions to Oly Rowan at 309-675-7970 or Rowan_Olga@cat.com

Abstract:

It is well established that the mechanical and physical properties of engineering alloys can be tailored for a given application through a suitable control of the microstructural parameters. Significant advancements have occurred in the performance of materials used in many structural applications because of an improved understanding of the factors controlling the microstructure in a material. Various thermal and thermomechanical treatments have been developed for the control of i) grain size in the primary phase and ii) the size, distribution and morphology of the secondary phases. In addition, progress has been achieved in understanding crystal defects such as vacancies, dislocations, interstitials and interphase interfaces that have a strong influence in determining properties such as strength, ductility, toughness and fatigue resistance. The purpose of this presentation is to review some of these developments and to demonstrate basic thermodynamic and kinetic factors controlling the evolution and/or modification of the microstructure. The principal phase transformations associated with the formation of the microstructure will be highlighted. The distinguishing features of atomic mechanisms and the underlying rate equations will be presented. A description of the basic strengthening mechanisms that can operate in different materials will be provided. The judicious use of appropriate strengthening mechanism(s) to control the delicate balance between strength and toughness is vital to the performance of the material in demanding structural applications.

Speaker:

Satya Shivkumar, a graduate of the Indian Institute of Technology (1980) and Stevens Institute of Technology (1987) is a Professor of Mechanical Engineering and Materials Science and Engineering at Worcester Polytechnic Institute, Massachusetts, where he has been working since 1989. His research interests are in the areas of structure-property correlations in metallic alloys, plastics, and biomaterials. He is the recipient of the Howard Taylor Award (1989) and the AFS Award for Scientific Merit (1993). He has over 100 publications in various areas of materials engineering.

