



**BILKENT UNIVERSITY**

**unam** - INSTITUTE of MATERIALS SCIENCE & NANOTECHNOLOGY

## ***FACULTY OF SCIENCE***

### **MATERIALS SCIENCE and NANOTECHNOLOGY GRADUATE PROGRAM SEMINAR**

#### **“Nanostructured Composites with Unique Architectures and Their Sources of Bioinspiration”**

**Asst. Prof. Dr. Arcan F. Dericioğlu**

Middle East Technical University

*Department of Metallurgical and Materials Engineering*

Mechanical reliability and thermal stability of the components utilized in advanced engineering applications such as electronic and optical devices, MEMS, sensors etc. generally limit their functional integrity under service. This limitation can be overcome by improving the mechanical properties of the constituent materials that operate at elevated temperatures in limited volumes with constantly increasing performance requirements.

Towards the ultimate goal of achieving mechanically more reliable materials with higher specific stiffness, strength, fracture toughness etc. scientists and engineers have been using natural materials as their source of inspiration. Besides their superior structural characteristics, natural materials reveal further qualities such as miniaturization, adaptability and multifunctionality which place them to the center of “bioinspiration.” The extraordinary set of properties of natural materials is a result of their complicated design or architecture, which often has a hierarchical arrangement from nanometer to micrometer scale. For this reason, there is an increasing effort to fully decode the phenomena behind these properties and to artificially create or “biomimic” similar structures. In this regard, in recent years “biomimetic” studies have focused on various natural materials such as mother of pearl (nacre), wood, bone and sponge spicules.

This seminar will cover our efforts towards understanding the mechanical property – microstructure relationship in some of the natural composite materials and extending this knowledge to create their artificial counterparts. In this scope, our study on the structural and mechanical characterization of a sponge spicule (Euplectella Sponge) will be presented. Following this, our ongoing research on the fabrication and characterization of bioinspired multilayered and nano-laminar composites will be introduced. In this context, results based on a ceramic-ceramic multilayered composite as well as on the ceramic-polymer nano-laminar composites processed by the novel fabrication techniques we have developed will be presented.

**Date : November 12, 2009 (Thursday)**

**Time : 15:40**

**Place : Faculty of Science Building, A Block, Seminar Room (SA 240)**

**Tea and cookies will be served after the seminar**



**BILKENT UNIVERSITY**

**unam** - INSTITUTE of MATERIALS SCIENCE & NANOTECHNOLOGY