



BILKENT UNIVERSITY

unam - INSTITUTE of MATERIALS SCIENCE & NANOTECHNOLOGY

FACULTY OF SCIENCE

**MATERIALS SCIENCE and NANOTECHNOLOGY
GRADUATE PROGRAM SEMINAR**

“Emphasis of Particle Shape in Nanomedicine Applications”

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Nanoparticles, such as nanospheres, tubes, and wires, have been proposed for use in various biotechnological applications including biosensing, bioseparations, and biomolecule delivery. Spherical nanoparticles, however, are more widely used because this shape is easy to make, and spherical particles can be synthesized from a diverse range of materials, such as liposomes, polymers, dendrimers and various inorganic compounds. Liposomal and polymeric nanospheres, in particular, are employed significantly for therapeutic applications, which have motivated numerous studies on the effect of a particle's size on its clearance, circulation, and distribution in vivo. While these have led to insights into the role of particle size, the effect of a particle's shape on its biological properties remains largely unknown. Recent studies are beginning to show the remarkably improved biological properties of non-spherical particles (such as increased blood circulation time) over spherical counterparts. The major reason for the limited use of non-spherical particles in biomedical applications is the lack of fabrication methods to simultaneously and precisely control the size and shape of nanoparticles. Two different approaches that use anodic aluminum oxide (AAO) structures have been recently introduced to address these challenges. The first one utilizes AAO as template material to produce monodisperse silica nano test tubes via surface sol-gel chemistry. These nanostructures are potential candidates for biomolecule delivery due to their controllable large inner volumes and chemically modifiable surfaces for special targeting studies. The second approach involves the creation nanoporous Si molds from AAO etching masks and the subsequent use of these molds in a nanoimprinting setup to fabricate free-standing composite polymeric nanorods with tunable lengths. Details about template and mold fabrication, particle production and potential applications will be discussed.

Date : September 24, 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