FACULTY SEMINAR

HIGH RESOLUTION 3-D CHARACTERIZATION OF NANOMATERIALS USING TILT TOMOGRAPHY IN THE SCANNING TRANSMISSION ELECTRON MICROSCOPE

Ilke Arslan

University of California-Davis, Department of Chemical Engineering and Materials Science,

One Shields Ave. Davis, CA 95616, USA.

Nanotechnology has become a key component in the field of materials science. Rather than analyzing and determining the properties of bulk single or poly-crystals where the third dimension is assumed to be uniform, we must now analyze materials that have a finite size and shape in three dimensions, and not necessarily uniform in any of the directions. This new demand on materials characterization has led to the development of electron tomography for inorganic materials using Z-contrast imaging in the scanning transmission electron microscope (STEM). This technique involves taking a series of images of the sample at different tilt angles, normally ranging between -70° to +70° every 1 t o 2 degrees, and using these two dimensional images to reconstruct a three dimensional volume of the sample. This tilt range may increase depending on the sample geometry and the holder used, but we are constantly battling against an artefact in the reconstruction called “the missing wedge.” This effect may be reduced greatly by performing dual axis tomography, or overcome completely using new holder technologies, but each technique has its pros and cons. These benefits and limitations will be discussed through examples of different inorganic materials.

Date and Time: 26 June 2009, 11:15 am
Place: B-Building Conference Room

This talk is sponsored by EU 7FW project Unam-Regpot (Grant No:203953)