

3-D X-ray images of nanoparticles

November 27 2006

A new X-ray microscope can look at nanomaterials in three dimensions.

Subhash Risbud, professor of Chemical Engineering and Materials Science, John Miao from UCLA, and colleagues from Japan and Taiwan just published a paper in *Physical Review Letters* describing a new X-ray microscope that can look at nanomaterials in three dimensions. The device could be used for making better materials, for example for use in electronics, optics and biotechnology.

Transmission electron microscopy (TEM) has traditionally been used to study nanomaterials, but because electrons do not penetrate far into materials, the sample preparation procedure is usually complicated and destructive. Furthermore, TEM only gives two-dimensional images.

The new method shines a powerful X-ray source onto a nanoparticle and collects the X-rays scattered from the sample. Then computers construct a three-dimensional image from that data. The microscope can resolve details down to 17 nanometers, or a few atoms across.

Quantum dot Using the new microscope, Risbud and colleagues were able to take detailed three-dimensional pictures of a “quantum dot” of gallium nitride, and also to study the structure inside it at a nanometer scale. Quantum dots are tiny particles that change their optical and electronic properties, depending on the particle size. Gallium nitride quantum dots could be used in blue-green lasers or flat-panel displays.

“The present work hence opens the door for comprehensive,

nondestructive and quantitative 3D imaging of a wide range of samples including porous materials, semiconductors, quantum dots and wires, inorganic nanostructures, granular materials, biomaterials, and cellular structure,” they wrote.

Source: University of California - Davis

Citation: 3-D X-ray images of nanoparticles (2006, November 27) retrieved 17 April 2024 from <https://phys.org/news/2006-11-d-x-ray-images-nanoparticles.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.