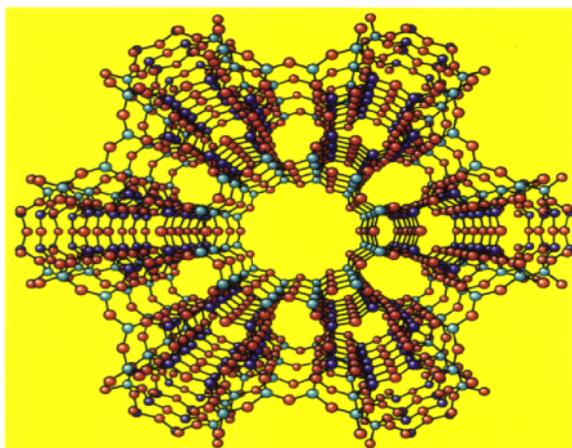
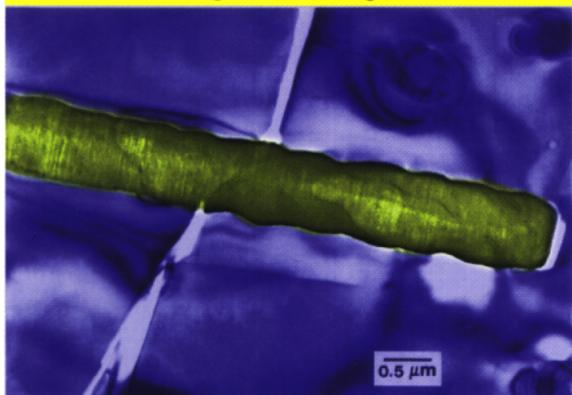


AND SHAPING THE FUTURE



Molecular Structure. The Nation's largest petroleum and chemical companies use BES synchrotron facilities and neutron sources to gather information about the three-dimensional structure of molecules involved in their manufacturing processes. Knowledge about the local environment of specific atoms in zeolite catalysts, for example, could lead to more efficient petroleum refining.

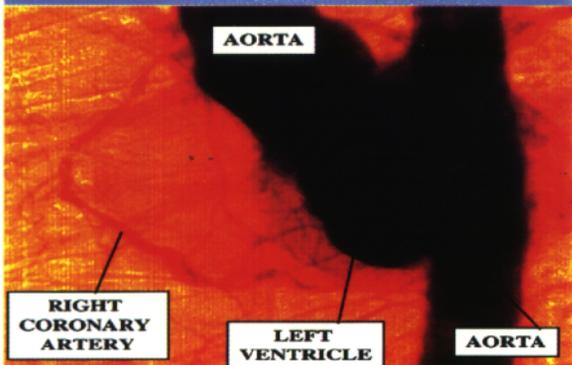


Solar Cells. A solar cell developed by BES researchers has set a world record for efficiency-29.5%. This achievement, if duplicated in production cells, will significantly broaden the applications for solar electric power.



Toughened Ceramics. BES research has contributed to the development of new tough ceramics that are finding a wide range of industrial applications including high-speed cutting tools, ceramic die inserts, and hot gas filters. According to independent market assessments, sales of these products are expected to exceed \$200M annually by 2000. Fundamental ceramic research, including modeling, interface characterization, and process science, has been essential in determining how to control the microstructures and the properties in these ceramics.

Process Modeling. BES experimental research is extended through sophisticated numerical simulations which can mimic the behavior of materials in automobile crashes or the transport of contaminants in aquifers. A model developed to study the fundamental chemical interactions that occur during chemical vapor deposition, an important technological processing technique used in fabrication of semiconductors and other types of thin films, is widely used in industry. The model helps researchers and process managers to understand vapor phase chemistry.



Imaging Science. Synchrotron light sources produce X rays able to probe, analyze, and image materials on a near nanoscopic scale-including semiconductors, magnetic materials, ceramics, polymers, and biological molecules. The unique properties of these X rays result in a wide range of applications from medical research aimed at eliminating the dangerous catheterization required by x-ray angiography for diagnosing and monitoring heart disease to looking at individual bits a computer disk while developing magnetic media with more storage capacity.