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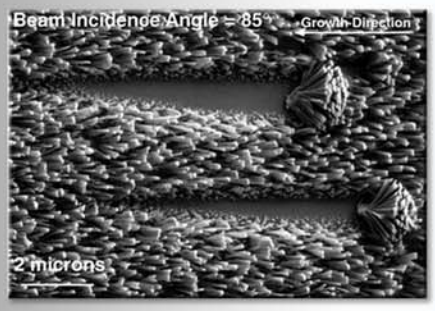

Annual Report 2000

Chemical Structure and Dynamics

March 2001

Pacific Northwest National Laboratory
Operated by Battelle for the U.S. Department of Energy

Cover Photo: ***An electron micrograph of a 1-micrometer-thick, nanoporous MgO film, demonstrating the effect of material synthesis using a molecular beam at a high angle of incidence. The beam impinges from the right at an incidence angle of 85°, forming a film consisting of an array of highly oriented, predominantly independent, columnar filaments tethered to the underlying substrate. The shadowing effect (the two areas where the MgO filaments are not observed) is due to small specs of dust on the substrate that act to block the deposition.***

CS&D researchers speculate that the largely independent filaments are responsible for the film's high-temperature stability and will facilitate transport of reagents within the film. Additionally, low energy electron diffraction and x-ray diffraction analyses reveal that the films are crystalline. These properties make the nanoporous MgO films good candidates for further studies in heterogeneous catalysis. Precise control of the composition and structure of nanoporous materials can lead to a more fundamental understanding of reactions that occur in restricted geometries, as well as to the design and synthesis of better materials for chemical applications.

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Chemical Structure and Dynamics

Steven D. Colson, Associate Director
Robin S. McDowell, Program Manager
and the Staff of the Chemical Structure
and Dynamics Program

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