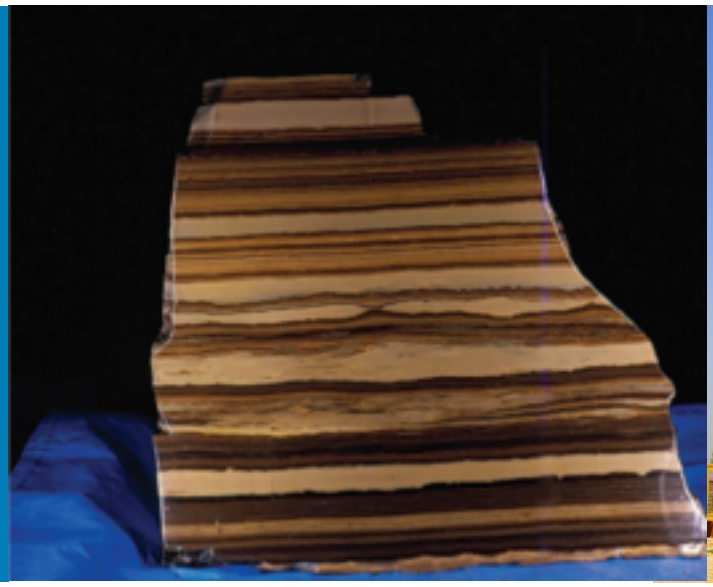
Argonne NATIONAL LABORATORY

HIGH-BRIGHTNESS X-RAY ANALYSIS CAN IMPROVE RECOVERY OF OIL AND NATURAL GAS



Solid oil trapped in shale rock shows up as narrow black bands. Underground removal requires liquefying the oil to free it from the shale.

The oil and gas industries are undergoing a revolution that has opened previously inaccessible resources trapped in shale and tight-play formations.

These reserves are estimated to dwarf traditional reserve quantities, but current extraction processes fall short, and recovery rates for unconventional oil are much lower than for conventional wells.

Argonne National Laboratory scientists working with industry at the U.S. Department of Energy Office of Science's Advanced Photon Source (APS) x-ray facility at Argonne have developed new techniques to more accurately map out the global distribution of pore sizes and how that distribution changes across the reserve bed as pressure for extraction is applied. X-ray techniques also are helping to refine and test new catalysts aimed at developing environmentally-friendly and cost-effective extraction processes.

IMPACT

The ability to tap into nonconventional energy reserves widens the nation's energy base, reduces reliance on foreign energy, and drives the continuation of a U.S.-based bulk chemical industry. Petroleum and methane serve as key ingredients in the chemical production of myriad products such as plastics.

The use of catalysts to free trapped reserves serves as an environmentally-friendly alternative to strip mining and utility-powered underground heating systems.

PARTNERS

During the past five years, scientists from Argonne's X-ray Science Division and the University of Utah have helped Chevron scientists refine, test, and patent a new catalyst. Additional studies are ongoing with energy industry representatives.

FUNDING

The U.S. Department of Energy Office Science provides funding for the APS. Chevron provided funding for the portion of the work it patented.

TIMELINE

It took about five years between the time initial work was done by Chevron at the APS and when Chevron received a patent for a new catalysis process to extract shale oil.

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