Discovering oil at micro level

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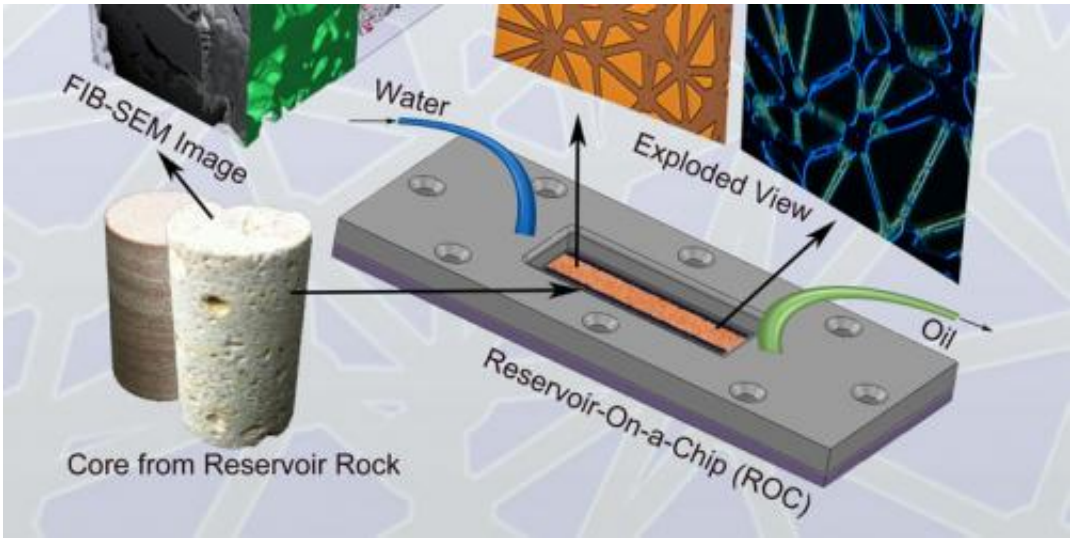

(PhysOrg.com) -- Getting trapped oil out of porous layers of sandstone and limestone is a tricky and costly operation for energy exploration companies the world over. But now, University of Alberta researchers have developed a way to replicate oil-trapping rock layers and show energy producers the best way to recover every last bit of oil from these reservoirs.

Mechanical engineering professor Sushanta Mitra led a research team that uses core samples from oil drilling sites to make 3-D mathematical models of the porous rock formations that can trap huge quantities of valuable oil.

“The process starts with a tiny chip of rock from a core sample where oil has become trapped,” said Mitra. “That slice of rock is scanned by a Focused Ion Beam-Scanning Electron Microscopy machine, which produces a 3-D copy of the porous rock.” The replica is made of a thin layer of silicon and quartz at Nanofab, the U of A’s micro/nanofabrication facility.

The researchers call the finished product a “reservoir on a chip”, or ROC.

“The hugely expensive process of recovering oil in the field is recreated right in our laboratory,” said Mitra. He explains that researchers soak the ROC in oil and then water, which is under pressure, is forced into the chip to see how much oil can be pushed through the microscopic channels and recovered.

“ROC replicas can be made from core samples from oil-trapping rock anywhere in the world,” said Mitra. “Oil exploration companies will be able to use ROC technology to determine what concentration of water and chemicals they’ll need to pump into layers of sandstone or limestone to maximize oil recovery.”

The research findings were published at the cover article in the journal *Lab Chip*, a publication of the Royal Society of Chemistry.

Provided by University of Alberta