FEI offers solution for unconventional natural gas extraction

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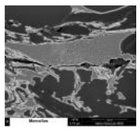
Microscope manufacturer FEI Company recently announced a novel solution for analyzing the production characteristics and potential of unconventional gas reservoirs. The Helios NanoLab DualBeam system images kerogen, porosity and microstructures in three dimensions (3D) with nanometer-scale resolution. The data are essential to determining the production potential of the reservoir, optimizing extraction procedures and designing simulators of the nanoscale pore structure.



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Example of an image generated by Helios for the study. Image: FEI

"Huge reserves of natural gas are known to exist in unconventional gas reservoirs, but it is difficult to produce this gas because it is trapped in poorly connected networks of pores with dimensions as small as a few nanometers," said Dr. Paul Scagnetti, vice president and general manager, Natural Resources Division, FEI. "The ability to understand the structure of these networks allows geologists to make more accurate predictions of producible gas and optimize its extraction."

The University of Oklahoma, in collaboration with Devon Energy, is an early adopter of this novel solution. The Helios system captures images and develops a 3D microstructural model of the pore structure, including the subvolumes of kerogen and its connectivity. The data produced by the Helios are central to a series of recent publications (1, Sondergeld et al. 2010; 2, Sondergeld and Rai 2010; and 3, Curtis et al. 2010) that cast these unconventional reservoirs in a new, more complex light.

"This imaging and analysis capability is the gateway to understanding, and more efficiently extracting, gas from these enormous global hydrocarbon assets," stated Dr. Carl Sondergeld, Professor and Curtis W. Mewbourne Chair, Mewbourne School of Petroleum and Geological Engineering, Oklahoma University.

Sondergeld adds, "Early observations demonstrate that organic matter is distributed differently in different shales, and that this organic material is more porous than previously imagined. The pores are so small that they require new physical controls on the behaviors of gases. The existence of this previously unimaged pore space helps to explain why there is so much producible gas in shales. The images also explain why production declines so rapidly in some of the unconventional shale reservoirs. As a result, this new information is forcing many to reconsider previously held beliefs about unconventional shale reservoirs."

1 Sondergeld, C. H., Ambrose, R. J., Rai, S. S. and Moncrieff, J. "Microstructural Studies of Gas Shales," SPE131771. Unconventional Gas Conference, Pittsburgh, Pennsylvania, February 23-25, 2010.

2 Sondergeld, C. H. and C. S. Rai. "Nanoscale Imaging Visualizes Shale Gas Plays," Exploration and Production, pp. 51-52. Hart Energy Publishing LP, September 1, 2010.

3 Curtis, M., R. J. Ambrose, C. H. Sondergeld and C. S. Rai. "Structural Characterization of GASD Shales on the Micro- and Nanoscales," SPE137693. Canadian Unconventional Resources and International Petroleum Conference, Calgary, Alberta, Canada, October 19-21, 2010.

FEI Natural Resources

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