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Using Micromodels to Study Heavy Oil Displacement by Foam

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Micromodels are a proven platform for offering new insights into the area of foam enhanced oil recovery (EOR). These tools provide us with not only analytical information for the characterization of particular oil-surfactant systems but also allow us to gain fundamental insight into the mechanisms that drive the oil displacement process. In addition, the polymer-based micromodels we use offer a combination of organic solvent resistance, reproduction of physical rock properties, and ease of manufacturing. In this talk, I will discuss our recent work using micromodels to visualize and probe the mechanisms of heavy crude oil displacement by surfactant-stabilized foams. On the pore-scale, we observe several key mechanisms that lead to high oil displacement even at low capillary numbers. Interfacial interactions, wettability alteration, foam generation, and foam destruction were all phenomena of interest in our experiments. Using micromodels, we are able to gain new information about our oil recovery platform and ultimately improve upon our understanding of how to design effective foam-flooding strategies.

References

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Primary authors: Mr VAVRA, Eric (Rice University); Dr BISWAL, Lisa (Rice University); Dr HIRASAKI, George (Rice University)

Presenter: Mr VAVRA, Eric (Rice University)

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