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Direct Imaging of Two-phase Flow in Porous Media at the Pore Level AMBER KRUMMEL, STEFAN MUNSTER, STEFAN LINDSTROEM, DAVID WEITZ, Harvard University — The dependence of residual oil saturation on capillary number is investigated during a series of two-phase flow experiments. We exploit the spatial and time resolution of confocal microscopy to collect three-dimensional images during the course of two-phase flow experiments. The engineering of an optically transparent, three-dimensional micromodel affords direct imaging of the fluid configurations while the physical characteristics of the flow are measured. An optimal capillary number for oil production is observed. Beyond this point the entrapped residual oil actually increases while the relative permeability of the medium increases. The origin of this counterintuitive behavior lies in the size distribution of the residual oil ganglion.

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