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Visualizing and studying Multiphase flow in ITO coated microcapillary.

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A technique for studying flow in porous media at the lab scale has been previously developed in our laboratory. The technique involves a confined miniature cylindrical geometry that is obtained by heating and pulling on a 100ml cylindrical capillary. The narrow region of the capillary, tapered and cylindrical, is filled with cryolite to form a random, porous medium, and two-liquid-phase-flow experiments are conducted in this region. This experimental setup offers unique and novel ability to monitor two-phase flow in a transparent random porous medium in real-time. Also, the images and videos obtained from this experimental setup can be analyzed to obtain useful information, such as the flow pattern, oil mobilization efficiency, and hydraulic conductivity. In the present work, a thin film of Indium Tin Oxide (ITO) is coated on the outside of the capillary to render the capillaries electrically semi-conductive. By applying electric current to the outside of the coated capillary, the temperature of the capillary is elevated, and two-phase-flow experiments at elevated temperatures are conducted in the porous medium.

References

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