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Role of water-soluble polymer on foam-injection process for enhancing oil recovery

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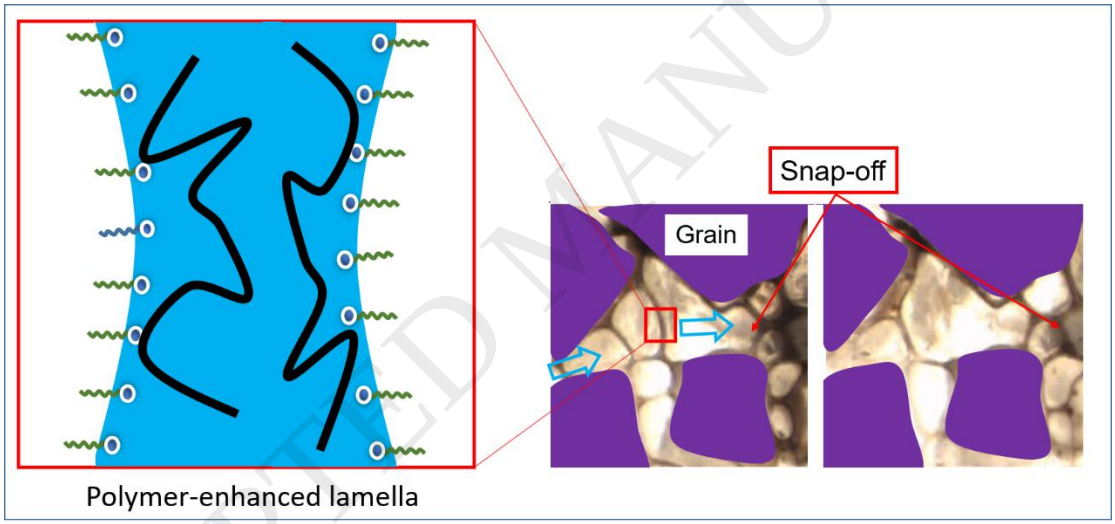
Graphical abstract



Role of polymer on foam transportation in porous media is still not entirely illustrated. In this study, we performed the foam injection process in cores and the parallel-layered micromodel, respectively. Combined with a series of static investigations, we found that the adding polymer to foam could not only effectively generate a viscous force, but also create a protective enclosure around the bubble (i.e., viscoelastic film). This synergistic effect was supposed to increase the foam apparent viscosity, promote the foam strength in the low-quality regime, create the shear-thickening behavior, and restraint the defoaming effect of crude oil. The microflow experiments indicated that polymer-enhanced foam was capable of sharply increasing the sweep efficiency and EOR. Meanwhile, the presence of viscoelastic liquid films contributed to the microflow behaviors.