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# EOR on-chip experiments: on the effect of the viscosity ratio on tertiary oil recovery

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## Abstract

In enhanced oil recovery (EOR), tertiary oil recovery after the water-flooding period is less studied than secondary flooding technique. Moreover, core-flood experiments at the darcy scale are the usual method used to study the efficiency of the chosen lever to increase the recovery rate of the original oil in place (OOIP) (1,2). However beside reproducibility aspects, a significant drawback is that with these black box experiments, we cannot observe and capture key phenomena at the pore scale, including interfacial interactions and details about mobilization of the trapped oil (*e.g.* size and distribution of residual ganglia). This is why microfluidic micromodel devices are now extensively used in lab EOR experiments. They preserve the structural details of the rock while offering advantages such as easy cleaning and repeatability. Visual tracking of fluids displacement is particularly important as it can provide more details about the behavior of wetting and non-wetting phases in porous media, aiding in targeted strategies to enhance oil recovery rates. A typical strategy to enhance the recovery of OOIP is to modify the properties of the injected fluids (3). This same approach is followed here where the size distribution of the ganglia of the non-wetting fluid trapped in the porous medium as well as their trapping mechanisms are also analysed. This contribution focuses in particular on the effect of the ratio of injected fluid viscosity over the oil viscosity and of the Capillary number ( $Ca$ ) on the oil mobilization trends, non-wetting fluid trapping and characteristics and becoming of oil ganglia.

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