Wettability alteration in shale formations can be an important factor in improving the performance of hydraulic fracturing treatments. The use of surfactants in the frac fluid, at proper concentrations, has shown to change wettability in Unconventional Liquid Reservoirs favoring the process of imbibition.

A core-flooding system was designed to be combined with the CT-scanner. The integrated system enabled us to dynamically visualize the movement of the fluid as it penetrated the shale samples in real-time. After processing the real-time CT-data, qualitative and quantitative experimental results were obtained, and color-coded relative density images. The core flood experiments are expected to represent the amount of penetration of different surfactant fluids in the ULR in hydraulic fracturing jobs.

Core flooding and CT scan results shows that surfactants, anionic and nonionic, have higher initial and total penetration magnitude than frac fluids without surfactants. Surfactant floods were successful in displacing oil when flooding without surfactants fails to drain oil from the core sample.

Surfactants can improve matrix penetration with spontaneous imbibition which opens further discussions for EOR potential in shale formations.