Pore-scale investigation of low salinity waterflooding in sandstones:

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For research on understanding multiphase flow description in porous media wettability is one of the important parameters studied. New methods are considered for a better description of wettability changes in multiphase flow, of interest for example for low salinity flooding where wettability change is one of the underlying mechanisms. The measurement of zeta potential is one of these new methods. Zeta potential statically characterizes the transition zone between rock and liquid regarding the surface charge and fluid interaction.

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In this project, the objective is to proof whether the zeta-potential measurements of rock-brine system can be used to predict the surface characteristics behavior during low salinity waterflooding and consequently additional oil recovery. Detectable with zeta-potential measurements are double-layer expansion and surface force modification, parameters recognized as important mechanisms of low salinity waterflooding. The zeta-potential measurements of glass beads/crushed sandstone are used to investigate the sandstone-brine surface properties at different salinities and pH. Afterwards, the optimum chemical condition of the injection brine is examined in two-phase displacement micromodel experiments for a better understanding of pore-scale mechanisms of low salinity waterflooding EOR method.

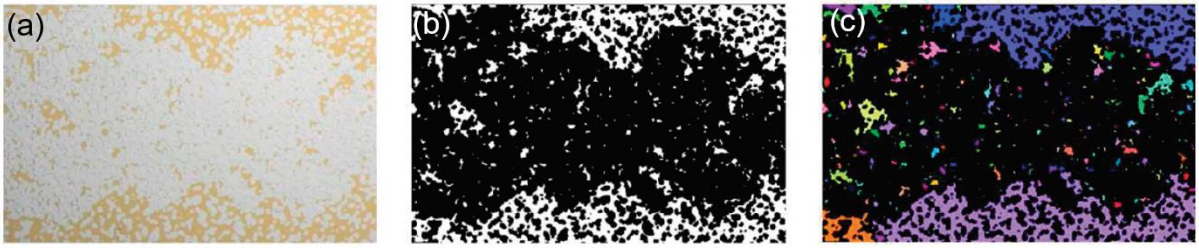

Figure (a) Pre-processing image of a microchip after water flooding (oil = gold, glass and brine transparent). (b) Segmented, binary image to enable quantitative analysis (oil in white). (c) Oil clusters colored individually for qualitative analysis. [from Aadland et al. Nanomaterials **2020**, 10, 1296]