Evaluating fibre optics as detection method for mineral precipitations in geothermal fluids

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The precipitation of minerals such as calcite, barite, or silica is a well known phenomenon in geothermal plants. These scales can damage plant equipment or reduce the injectivity of the reservoirs leading to increasing maintenance costs or a shortened operation liftime of geothermal facilities. Reduction or prevention of precipitations is commonly achieved by application of anti-scalants. However, the performance of these scaling inhibitors varies considerably from one geothermal site the other depending on a variaty of factors such as fluid chemistry, salinity, temperature and pressure characteristics, and scale composition. The efficiency of an inhibitor in a specific geothermal fluid is hardly predictable and needs to be tested before application. For geothermal purposes the inhibitor will be added to the geothermal fluid under reservoir conditions, which are characterized by high pressure and high temperature (HPHT). Experimental methods are needed that allow the measurement of the inhibitor efficiency under HPHT conditions and in fluids with high salinity.

In this study, a new method to evaluate scale inhibitors efficiency based on fibre optics was examined with respect to its suitability at HPHT conditions. Synthetic fluids were used to test fibre optics as detection method for baryte and silica scaling in laboratory autoclaves that allow HPHT conditions up to 200 °C and >100 bar. Additionally, the influence of different ionic strenghtes of the fluid was investigated.