

Re-evaluation of mineral particles in geothermal fluid: Focus on polysilicic acid and adsorbed particles

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In geothermal system, the solubility of monosilicic acid concentration in geothermal fluid is controlled by physicochemical conditions. Once the supersaturated condition with respect to amorphous silica attained, the polymerization of silicic acid begins followed by the formation of the particles of polysilicic acid. In addition, the particles adsorbed on the solid surface can be a trigger for the further siliceous deposit. Therefore, in order to investigate the formation mechanism of siliceous deposit, the polysilicic acid particles formed by polymerization of silicic acid and the particles adsorbed on the solid surface in geothermal fluid are focused in terms of those size and chemical composition.

In this study, the polymerization mechanism of silicic acid is discussed based on the size variation of polysilicic acid in geothermal fluid as a function of time measured by dynamic light scattering (DLS) in addition to TEM observation of fractionated polysilicic acid. The filtered particles with different pore size and the adsorbed particles on the copper pipe are analyzed by SEM-EDX to characterize the particle size and chemical composition of the particles.

We expect that these results can be basic information for the prevention technology of siliceous deposit formation on the surface of heat exchanger during geothermal binary power generation.

Keywords: polysilicic acid, geothermal fluid, binary power generation, polymerization of silicic acid, mineral particles