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***Why Downhole Materials Thermal Properties matter in Geothermal Well Construction?***

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Geothermal well construction poses additional challenges due to their depth and temperature profile. Successful geothermal projects require a long term integrity of the well so that the well costs versus energy output ratio will be low. Geothermal wells can be exposed to cyclic cooling and heating cycles, which suggests that thermal properties of the casing-cement system is one of the most critical parameters that control the integrity of the well. Though many casing-cement properties have been investigated by researchers, thermal properties are the least studied parameter. Moreover, the elevated temperature in the geothermal wells makes thermal properties the most important parameter to be considered. Expansion and contraction of the cement due to temperature fluctuation can affect the cement's bonding with the formation and casing and create micro-annuli in the cement matrix. The results from this study can be used to find the integrity of the cement through simulations for geothermal wells. This paper will discuss the impact of thermal properties of various cement recipes on the well integrity.