# Properties of Bound Water Associated with Smectites. (S01-logsdon140854-Oral)

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## Abstract:

Dielectric spectroscopy has been used to characterize various materials such as polymers, glass, and biological membranes. The objective of this study is to extend this tool for investigating humidified clays. We started with a simple clay -- water system, in which four smectite clays are saturated with Ca, Mg, K, or Na, each humidified to four different levels (54 to near 100 % relative humidity). The humidified clays were packed into a coaxial cell, and the dielectric spectra were measured for temperatures ranging from 10 to 35 C. There were two paths of analysis; the first was to consider the liquid properties of the bound water in the hydrated smectites (i.e. activation energy for dipole rotation, viscosity, diffusion). Bound water had viscosity orders of magnitude larger than free water, much slower diffusion, and higher activation energies. These bound water properties covered wide ranges of values. The second approach was to treat the hydrated smectite as a disordered solid, and consider clustering imperfections caused by the applied electrical field, especially in relation to the complex electrical conductivity spectra. Both approaches will be discussed in this presentation.

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