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Structural effects on the dielectric response of porous media

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Since Topp's seminal paper, deviations from Topp's curve have often been ascribed to 'bound' water. Here we show that the structural configuration of grains in a porous media equally accounts for this response. We know that water under the influence of interfacial forces can have lower permittivity. For example, rotation around ions can be restricted and the permittivity of the water reduced in the microwave region. However, structural configuration can result in deviations from Topp's curve without the need to resort to the illusive 'bound' water in some media. In this presentation we will examine the effects of packing density, particle size distribution, particle shape, anisotropy and aggregation on the dielectric response of granular media. In addition, we will look at the dielectric response of clay minerals and suggest how the responses are likely related to geometry. This substantial body of work shows the importance of porous media structure in determining the effective dielectric permittivity in the microwave range? Used for the evaluation of water content in soils, sediments and other granular porous media.

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