

Investigation of Dielectric Properties of Evaporite Minerals to Interpret GPR Data

Sohely Pervin¹ and Douglas R. Schmitt¹

¹Department of Physics, University of Alberta, Edmonton, AB, Canada

Abstract

Proper interpretation of ground penetrating radar (GPR) images obtained in evaporite sequences requires knowledge of the dielectric properties of the constitutive minerals. Dielectric permittivity contrasts underneath the subsurface cause various reflections in GPR profiles and eventually provides important information about the objects. Measurement of dielectric properties of the evaporite minerals were performed over a frequency range of 10 MHz to 3 GHz using a commercially available RF impedance/material analyzer (Agilent 4991A) with an open-ended coaxial sensor (Agilent 85070A). Cold compression technique was used to prepare the samples from various mineral powders and core rock up to 250 MPa pressure. Furthermore, the mineral powder mixtures and the core rocks were grinded in a grinding machine and kept in an oven for couple of hours at about 80°C before pressurization. The porosity of the samples is reduced significantly due to the grinding, heating and high pressure. The permittivities measured from these synthetic samples were compared to the single crystals for accuracy. The changes of dielectric permittivity with the addition of additives according to their weight percentage were obtained as well.

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