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Spectroscopic and microscopic characterization of oil shale

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A series of oil shale samples was investigated by several non-intrusive spectroscopic and microscopic techniques. These samples were subjected to a range of temperatures in hydrous pyrolysis prior to investigation. Samples were then characterized by millimeter wave dielectric microscopy, atomic force microscopy (AFM), Raman spectroscopy, IR reflectance spectroscopy; as well as scanning acoustic microscopy and thermal-gravimetric methods. The goals of this research project were to produce detailed maps of dielectric permittivity and to correlate them with the local mineral content and chemical structure of the samples, after pyrolysis, as determined by the aforementioned methods. Understanding the morphology of the rock containing hydrocarbons, determining quantitative maps of organic content in the rock, obtaining the detailed pictures of fractures and fractures propagation are considered critical for making progress with the thermal or mechanical induction of oil release from the rock.