Dielectric properties of oil shale

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To better assess the potential use of slow-deposition-rate radio frequency (RF) dielectric heating for *in situ* recovery of oil from oil shale we are performing an experimental study measuring the frequency-dependent complex dielectric properties of oil shale as a function of saturation and temperature. Saturation varies between dry and 100% water saturated; temperature will be controlled from 23 to 200°C; and the frequency range is from 1 MHz to 1 GHz. *In situ* RF heating is a technique worthy of study because of the environmental advantages, and, if feasible, RF heating can possibly provide improvements in heating efficiency and process control that other methods such as direct current heating, inductive heating, or steam injection cannot provide. The method also has the potential for less energy expenditure and fewer wells, thereby reducing both carbon emissions and operational cost. Previous studies of RF heating conducted in the 1980s focused on high-energy rapid *in-situ* heating and led to the conclusion that RF heating is not a viable process. Our survey of literature gives no conclusive evidence for accepting or rejecting slow-deposition-rate RF dielectric heating (with slower heating rates, oil will evolve at lower temperatures but take longer to accomplish) as a viable oil shale heating technology. The primary difficulty in assessing the potential of RF heating technology is that the fundamental dielectric properties of oil shale at conditions approximating *in situ* conditions are not understood. We present our experimental results on well-characterized samples under controlled conditions to answer some of the key questions needed to assess the feasibility of *in-situ* RF heating as a viable process for oil shale exploitation.