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Frequency-Dependent Dielectric Behavior in ER Fluid STEPHEN TSUI, FENG CHEN, JASON SHULMAN, YUYI XUE, Texas Center for Superconductivity and Advanced Materials, University of Houston, C.W. CHU, Hong Kong University of Science and Technology; Texas Center for Superconductivity, University of Houston; Lawrence Berkeley National Laboratory, WEIJIA WEN, Hong Kong University of Science and Technology — It is well accepted that the electrorheology (ER) of a fluid is directly related to the change of its dielectric constant ε. We investigate the frequency dependency of ε in the giant ER fluid consisting of urea-coated $Ba_{0.8}Rb_{0.4}TiO(C_2O_4)_2$nanoparticles suspended in silicone oil. The data show a step around 2 kHz, similar to those seen in other composite systems, which is typically interpreted via the Maxwell-Wagner polarization. Upon extending the measurement down to lower frequencies, the data suggest the existence of multiple relaxation processes in the ER fluid, some of which occur with characteristic time scales from 10^{-4} to 10^{2} s. The related microstructures are examined through impedance spectroscopy, and a comparison to other composite systems, including biological suspensions, will be discussed.

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