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Negative Static Dielectric Constant Under Electrical Field FENG CHEN, STEPHEN TSUI, JASON SHULMAN, YUYI XUE, C. W. CHU[1], Texas Center for Superconductivity and Advanced Materials, University of Houston, Houston, TX 77204-5002, W. J. WEN, Department of Physics, Hong Kong University of Science and Technology, Hong Kong — We report the sign change of the dielectric constant (ϵ') for the Ba-Ti-O based giant electrorheological (ER) fluid under the electrical field (E) up to 5 kV/mm. The data that extend to low frequency suggest that the static ϵ' changes from positive to negative under the dc bias. Models that were suggested for the left-handed materials (LHM), e.g. resonance models and plasmon models, are examined. Our analysis suggests that the self- assembled nanostructures under the electrical field and a large suppression of carrier collisions play key roles. The great potential for application of this phenomena will be discussed.

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