Abstract Submitted
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Electric-Field Induced Formation of Superconducting Balls R. TAO, X. XU, E. AMR, H. TANG, Dept. of Physics, Temple University, Philadelphia, PA — Ghosh and Hirsch recently claimed that many micrometer-size particles in liquid nitrogen, as large as between 25 μm and 32 μm, can be aggregated into balls by shaking. It turns out that they performed their experiments with liquid nitrogen in open air, the moisture condensed on their particle surface leading to ball aggregation by shaking. We repeated their shaking experiment and found that dry BSCCO, YBCO and Pb powders in liquid nitrogen do not form any balls by shaking in a glove bag filled with dry nitrogen gas. No matter how we shake the samples, these powders do not aggregate together. However, when we open the glove bag and let the air come to the samples, BSCCO, YBCO and Pb all form some balls quickly by shaking. Also inside the dry glove bag, when we apply an electric field and slowly increase it, superconducting particles form balls within two critical electric fields, E_{c1} and E_{c2} ($E_{c1} < E_{c2}$), while non-superconducting particles do not form balls at all. The electric field induced superconducting ball formation reveals that the area of interaction between electric field and superconductors requires more investigation. However, the phenomenon can be explained within the BCS theory.

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