

Abstract Submitted
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Conformational electroresistance and hysteresis in nanoclusters¹

XIANG-GUO LI, XIAO-GUANG ZHANG, HAI-PING CHENG, Department of Physics and Quantum Theory Project, University of Florida — Abstract: Existence of multiple thermodynamically stable isomer states is one of the most fundamental properties of small clusters. We show that the conformational dependence of the Coulomb charging energy of a nanocluster leads to a giant electroresistance, where charging induced conformational distortion changes the blockade voltage. The intricate interplay between charging and conformation change is demonstrated in a nanocluster Zn_3O_4 by combining a first-principles calculation with a temperature-dependent transport model. The predicted hysteretic Coulomb blockade staircase in the current-voltage curve adds another dimension to the rich phenomena of tunneling electroresistance. The new mechanism provides a better controlled and repeatable platform to study conformational electroresistance.

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