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Large Room-Temperature Resistive Switching Behavior in Spinel Structured Nanoparticle Compacts. TAE HEE KIM, EUN YOUNG JANG, NYUN JONG LEE, Ewha Womans University, JUNG-TAK JANG, Yonsei University, JIN-SIL CHOI, JINWOO CHEON, Yoensei University, KYUNG-JIN LEE, Korea University, EWHA WOMANS UNIVERSITY TEAM, YONSEI UNIVERSITY COLLABORATION, KOREA UNIVERSITY COLLABORATION — Here we report an abrupt and large bipolar switching behavior in the form of nanoparticle assembly consisting of an infinite number of monodispersed magnetic oxide single-crystallines. In the assembly of magnetite nanoparticles with size below 10 nm, we observed a room temperature current-voltage hysteresis with an abrupt and large bipolar resistive switching (switching ratio of $\sim$ 2000 %). We also found that such switching behaviors can be general phenomena for nanoparticle assemblies: not limited to magnetites but also consistently observed for other kinds of spinel structured nanoparticles with different compositions. Such a huge switching phenomenon it has never been observed before in bulk powders, particularly at room temperature. Our results showed clearly that the new I-V hysteresis is dependent on the nanoparticle size, and arises from interparticle contacts. In an effort to understand and interpret the origin of the bipolar reversible switching behavior, a new theoretical model was suggested in this work.

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