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Huge enhancement of the magnetoresistance in nanoparticle arrays ELENA BASCONES, VIRGINIA ESTEVEZ, Instituto de Ciencia de Materiales de Madrid (ICMM-CSIC) — The interplay between ferromagnetism and discrete charging control the controls the electronic transport through nanoparticle placed between two ferromagnetic electrodes. If the spin relaxation time in the nanoparticle is long, spin accumulation in the nanoparticle appears when the magnetic moment in the electrodes have anti-parallel orientation, but not for parallel orientation. Charging effects are strongly enhanced in nanoparticle arrays. Here we show that spin accumulation has a very strong effect in the transport properties of metallic nanoparticle arrays placed in between ferromagnetic electrodes. The observed behavior is qualitatively different to the case of a single island. Spin accumulation appears not also for antiparallel but also for parallel orientation of the electrodes's magnetic moments. In the last case, the threshold voltage at which current starts and the magnetoresistance are modified. Within the array the sign of the spin accumulation reverses leading to oscillations in the current and negative differential resistance and a huge enhancement of the differential magnetoresistance for a given range of voltages.

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