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Charge Transport in Magnetite Nanoparticle Arrays SEONGJIN JANG, HAO ZENG, University at Buffalo, the State University of New York — Charge transport properties of magnetite (Fe_3O_4) nanoparticle arrays were studied as a function of annealing conditions. These arrays were prepared by self-assembling chemically synthesized nanoparticles with micro-gaps between lateral electrodes. Annealing removed surfactant molecules and varied the interparticle spacing systematically. Arrays annealed under 200 ^{o}C are insulating. Arrays annealed between 200 ^{o}C to 500 ^{o}C show thermally assisted tunneling behavior, with the tunneling barrier decreasing with increasing annealing temperatures. Above 500 ^{o}C, a transition from tunneling to hopping mechanism is observed. Magnetoresistance decreases with increasing annealing temperature. For the hopping samples, Verway transition is observed from both the resistivity and magnetoresistance measurements. Work supported by NSF DMR 0547036

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