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Transport measurements across single nanoparticles QIAN YU, LIMIN CUI, Laboratoire de Physique et d'Etude des Matériaux, UMR 8213, ESPCI-ParisTech-CNRS-UPMC, 10 rue Vauquelin, 75231 Paris, France, CHRISTIAN ULYSSE, Laboratoire de Photonique et de Nanostructures, CNRS, Marcoussis, France, ALIREZA MOTTAGHIZADEH, ALEXANDRE ZIMMERS, HERVÉ AUBIN, Laboratoire de Physique et d'Etude des Matériaux, UMR 8213, ESPCI-ParisTech-CNRS-UPMC, 10 rue Vauquelin, 75231 Paris, France — During this last decade, numerous progresses have been obtained in the chemical synthesis of nanoparticle. Various materials (oxides, chalcogenides) known for their peculiar electronic or magnetic properties – superconductivity, Mott localization, topological protection – can now be obtained as nanoparticles through chemical synthesis. These new nano-materials are offering a unique opportunity to study the effect of quantum confinement on unconventional electronic orders. To improve the preparation of samples with single nanoparticles trapped within a nanogap, we developed a new method where nanoparticles are projected in-vacuum on chip circuits covered by nanogap spaced electrodes. Continuous current measurements during the projection allow identifying the trapping of a single nanoparticle within the nanogap. We apply the method for trapping single gold nanoparticles, which led to the observation of Coulomb blockade. We also applied the method to magnetite (Fe3O4) nanoparticles, which allows to study the electric field induced insulator to metal transition in only a few nanoparticles.

Qian Yu
Laboratoire de Physique et d'Etude des Matériaux,
UMR 8213, ESPCI-ParisTech-CNRS-UPMC,
10 rue Vauquelin, 75231 Paris, France

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