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Testing the charge transport mechanism in molecule-nanoparticle networks by molecular exchange VENKATA KAMALAKAR, IPCMS CNRS-University of Strasbourg, EDWIN DEVID, Leiden University, JEAN-FRANCOIS DAYEN, BERNARD DOUDIN, IPCMS CNRS-University of Strasbourg, SENSE JAN VAN DER MOLEN, Leiden University — Nanoparticles molecular networks have recently emerged as useful toolbox for molecular electronics studies. Nanoparticles bridging the size gap between molecules and macroscopic electrical interconnects make possible the realization of large self-assemblies of particles interlinked by molecules, with unique advantage of high reproducibility and robustness. This results from averaging over ensembles of molecules and make possible applications ranging from electrical, optical, mechanical, to spintronics devices. Electronic properties of well-organized two-dimensional networks, where Coulomb blockade regime is expected to be predominant, make these materials of high interest as model systems. We present temperature-dependent transport properties of networks bridging high aspect ratio trenches, making possible measurements over a wide temperature range. We study how the charge transport is modified when reversible molecular exchange is performed, tailoring the intrinsic conductance of the molecule. Quantitative agreement with experiments is obtained using a model clarifying the role played by the intrinsic conduction properties of the molecules and the geometry of the network.

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