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Influence of Linker Molecules on Charge Transport through Self-Assembled Single-Nanoparticle Devices. AL-AMIN DHIRANI, AMIR ZABET-KHOSOUSI, YOSHINORI SUGANUMA, KENNETH LOPATA, PAUL-EMILE TRUDEAU, Department of Chemistry, University of Toronto — We investigate electrical characteristics of single-electron electrode/nanoisland/electrode devices formed by alkanedithiol assisted self-assembly. Contrary to predictions of the orthodox model for double tunnel junction devices, we find a significant (∼five fold) discrepancy in single-electron charging energies determined by Coulomb blockade (CB) voltage thresholds in current-voltage measurements versus those determined by an Arrhenius analysis of conductance in the CB region. The energies do, however, scale with particle sizes, consistent with single-electron charging phenomena. We propose that the discrepancy is caused by a multi-barrier junction potential that leads to a voltage divider effect. Temperature and voltage dependent conductance measurements performed outside the blockade region are consistent with this picture. We simulated our data using a suitably modified orthodox model.

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