Electron Transfers Between Nanoparticles

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Monolayers and multilayer network polymer films comprised of 1-3 nm diameter nanoparticles ligated with a dense monolayer of thiolates can be prepared on electrodes by metal ion/carboxylate linkage chemistry[1,2]. Variables in these structures are the linking metal ion, the chemical nature and population of linker ligands relative to non-linker ligands, and the bathing environment of the films. The rates of electron transfers and of hopping conductivity in these and related nanoparticle films are influenced by both the linking and non-linking ligands and by the bathing environment [3]. The bathing environment effects reveal opportunities for vapor sensing; variation of electron tunneling efficacy with metal ion offers insights to how conductivity depends on bridge chemistry; and exploration of nanoparticle dimensions probes intrinsic quantum dot dynamics. Contemporary results in this area will be described.

Supported by NSF, ONR.

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