

# Gold Nanoparticles, Peptides, and Electron Transfer

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The synthesis, functionalization, and study of the physicochemical properties of gold nanoparticles protected by a capping molecular monolayer (monolayer-protected clusters, MPCs) are research areas of crucial importance in nanosciences and nanotechnologies. When the MPC core is limited to a low number of atoms and, the transition between bulk and molecule-like regimes, where electronic band energetics lead to quantum confinement effects, is observed. We found that thiolated oligopeptides based on the  $\alpha$ -aminoisobutyric acid (Aib) residue allow to form 1 – 2 nm particles. Because of a strong interchain hydrogen-bond network, these peptide MPCs are very stable. Being very small, they display distinct physicochemical features, also related to the fact that even when short the Aib oligopeptides form a secondary structure characterized by a strong oriented dipole moment. The homogeneous and heterogeneous electron-transfer properties of nanometer-size MPCs have been studied in detail by using electrochemical methods.