Synthesis of Hybrid Electroactive Materials by Low-Potential Electropolymerization of Gold Nanoparticles Capped with Tailored EDOT-Thiophene Precursor Units

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Résumé en anglais	The synthesis of gold nanoparticles (GNPs) capped with alkanethiols with terminal bithiophenic polymerizable groups, consisting of 3,4-ethylenedioxythiophene (EDOT) and 3-alkylsulfanylthiophene, is described. Transmission electron microscopy (TEM) and light diffusion show that these stabilized GNPs have an average size of 2–3 nm with low polydispersity. The electrochemical behavior of C10S-Au is investigated in dichloromethane in the presence of Bu4NPF6. The results show that these capped GNPs undergo straightforward and efficient electropolymerization under potentiodynamic or potentiostatic conditions. TEM images show that the electrodeposited films of the composite material present a very homogeneous structure, in which the size of the GNPs incorporated into the polythiophene matrix is unchanged. Results of cyclic voltammetry and spectroelectrochemistry obtained on polymer films deposited on platinum electrodes and transparent indium tin oxide electrodes, respectively, show that the reversible charging–discharging process and electrochromic behavior typical of poly(thiophenes) are preserved in the hybrid electroactive material.
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