

Surface decoration of indium tin oxide with amine-terminated dendrimers encapsulating nanoparticles via electrooxidative grafting

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Here, we report on the electrochemical grafting of amine-terminated dendrimers encapsulating nanoparticles onto indium tin oxide (ITO) surface. As model systems, we prepared two different dendrimer-encapsulated nanoparticles (DENs), i.e. Pt and Au DENs, using amine-terminated sixth generation polyamidoamine dendrimers, and subsequently immobilized the DENs onto ITO surfaces via electrooxidative grafting of the terminal amines of dendrimers to the surfaces. Electrochemical measurements and X-ray photoelectron spectroscopy (XPS) confirmed that the DENs were electrochemically grafted onto the ITO surface and not just physisorbed. We also demonstrated spatially controlled surface modification of ITO with the DENs by applying the method to ITO microelectrodes. The DEN-grafted ITO surfaces could be functionalized further with biomaterials using the available terminal amine on the immobilized dendrimers. We envision that this approach will provide facile and versatile means for spatially controlled surface functionalization of ITO with a variety of DENs and biologically active materials, which might be useful in a broad range of electrochemical biosensors.