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## Encapsulation and immobilization of copolymer @ Au NP's in thin films for biosensing applications

Gold nanoparticles (Au NP's) have been highly explored in biosensing applications due to their unique optical properties. However surface modification and functionalization are required in order to obtain functional and stable Au NP's in physiological medium. In turn, the use of reversible addition-fragmentation chain transfer (RAFT) polymerization offers the possibility of full control over the composition and architecture of polymeric shells and allows further biofunctionalization for specific bio targeting. Moreover, the immobilization of Au NP's in organized thin films is important to build biosensing devices. The Layer-by-Layer (LbL) technique is very promising for the preparation of such thin films since it is a scalable, easy and versatile technique. In this work, Au NP's were functionalized via RAFT-assisted encapsulating emulsion polymerization (REEP) and click chemistry. First, a macroRAFT (MR) agent based on poly(ethylene glycol) methyl ether acrylate (PEGA) and containing an azide function was adsorbed onto Au NP's (d=15 nm) to afford MR@Au NP's. Then a hydrophobic chain was growth from the MR@Au NP's surface via REEP to yield copolymer@Au NP's - shell@core type structures. The functionalized copolymer@Au NPs were obtained via click chemistry using an alkylated biotin. Visible spectroscopy has shown that these functionalized Au nanostructures are promising towards biosensing application, namely in the detection of the specific biotarget – avidin. Additionally, the interactions at molecular level between the block copolymer prepared under the same reaction conditions, were briefly studied using the Langmuir-Blodgett technique. Finally, thin films were prepared via LbL technique using the negative copolymer@Au NP's and the polycation poly(allylamine hydrochloride). The biosensing response of these films was assessed by optical spectroscopy using the avidin and bovine serum albumin as specific analyte and control, respectively. The results obtained have shown that REEP is a promising strategy to prepare robust functional plasmonic nanostructures towards biosensing application.

### Biography

Ana Barros Timmons has completed her PhD in Chemistry in 1997 from Manchester University. Since 1996 she has been lecturing at the University of Aveiro various courses related to Polymer Science and Chemical Engineering laboratories as well as participating in the coordination of a couple of joint European Master Courses in the field of Materials Science & Enginnering. She has published ca 70 papers in reputed journals and over 120 communications. Her research interests are foccused on the preparation and characterization of nanocomposite materials with particular emphasis on controlled polymerization mechanisms, thermal analyses and the use of renewable materials.

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