

METAL NANOPARTICLES FOR BIONANOPROBES AND MOLECULAR DETECTION

João Cortez^{a*}, Gonalo Doria^{a,b}, Ines Gomes^a, Pedro Quaresma^{b,c}, Adelaide Miranda^c, Nuno C. Santos^d, Peter Eaton^c, Eullia Pereira^c, Pedro Baptista^b, Ricardo Franco^a

^aREQUIMTE, Dept Qumica, Faculdade de Cincias e Tecnologia, Universidade Nova de Lisboa, 2829-516 Caparica, Portugal, ^bCIGMH, Dept. Cincias da Vida, Faculdade de Cincias e Tecnologia, Universidade Nova de Lisboa, 2829-516 Caparica, Portugal, ^cREQUIMTE and Departamento de Qumica, Faculdade de Cincias da Universidade do Porto, R. Campo Alegre, 687, 4169-007 Porto, Portugal, ^dInstituto de Medicina Molecular, Faculdade de Medicina da Universidade de Lisboa, Av. Prof. Egas Moniz, 1649-028 Lisboa, Portugal

* j.cortez@dq.fct.unl.pt

Our goal is to prepare nanoparticles (NPs) with surface functionalities that allow binding of biological molecules, namely, oligonucleotides and proteins. Au, Ag, Au/Ag, Fe₃O₄, FePt and other NPs, are synthesized and reacted with chemical functionalities for protein binding (*e.g.*, specific for His-tagged proteins) or thiol-oligonucleotides.

Derivatization with specific oligonucleotides has been used for DNA and RNA detection systems based on the differential non-cross-linking aggregation of AuNPs. The detection mechanism could be elucidated by Atomic Force Microscopy and ζ -potencial measurements. This system allowed detection of single base mutations/single nucleotide polymorphisms (SNP). A similar strategy was used for developing protein binding nanoparticles. The interaction of AuNPs with cytochrome c afforded bio-conjugates that present properties (surface charge, pH-induced aggregation) that are useful for their utilization as novel bio-nanoprobes.

Magnetic core-shell Au@magnetite NPs are being developed for one-pot gene detection-capture and protein purification.

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