



Novel Nano-Structured Chemosensors in Organic and Aqueous Phase

Javier Fernández-Lodeiro,^{a,b*} Cristina Núñez,^{a,c} Adrián Fernández-Lodeiro,^a Elisabete Oliveira,^a Hugo M. Santos,^a Alcindo A. Dos Santos,^b José Luis Capelo,^a Carlos Lodeiro^a

^aBIOSCOPE Group, REQUIMTE-CQFB, Chemistry Department, Faculty of Science and Technology, University NOVA of Lisbon, Caparica Campus, 2829-516, Portugal

^bInstituto de Química, Universidade de São Paulo, Av. Prof. Lineu Prestes, 748, CxP. 26077, 05508-000 São Paulo, Brazil

^cEcology Research Group, Department of Geographical and Life Sciences, Canterbury Christ Church University, CT1 1Q U, Canterbury, United Kingdom

*e-mail: j.lodeiro@campus.fct.unl.pt

Keywords: AuNPs, AgNPs, chemosensor

INTRODUCTION

Noble metal nanoparticles (MNPs) have been intensively pursued in recent years, not only for their fundamental scientific interest¹ but also for their technological applications, in analytical sensors, catalysis or fuel cells.² Several experimental routes have been recently proposed to efficiently self-assemble preformed MNPs into 1D chains.³

RESULTS AND DISCUSSION

Here we present new emissive materials (see Figure 1) and functionalized nanoparticles in order to explore their applications in 1D-chain formation-chemosensors.⁴

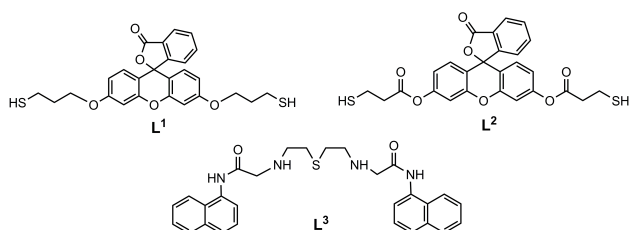


Figure 1. Schematic representation of compounds L¹-L³.

Changes in the surface Plasmon resonance (SPR) bands as well as colours due to the network of 1D assemblies of nanoparticles were observed (Figure 2). The chelation interaction of the Hg²⁺ ions with the carboxylate groups of chemosensor L¹ or the amine in L3 located in the AuNPs and AgNPs surface is the responsible of the selective formation of chains between the NPs modulated for the Hg²⁺ metal ions and viceversa.

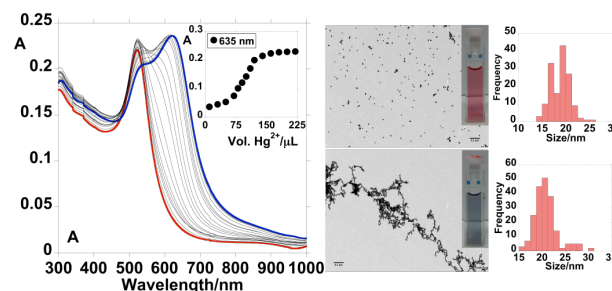


Figure 2. Spectrophotometric titration of AuNPs@L¹ with the addition of increasing amounts of Hg(NO₃)₂ in aqueous solution (left). Naked eye detection and TEM images of AuNPs@L with the addition of 200 μ L of [Hg(NO₃)₂] = 1.00 $\times 10^{-3}$ M (right).

ACKNOWLEDGEMENTS

We are grateful to Scientific Association ProteoMass (Portugal), Xunta de Galicia (Spain) for a research contract under project 09CSA043383PR (JFL) and I2C postdoctoral program (C.N). Authors are also grateful for the financial and structural support offered by the University of São Paulo through the NAP-CatSinQ (Research Core in Catalysis and Chemical Synthesis) and FAPESP for financial support.

REFERENCES

- a) J. Fernández-Lodeiro et al., *J. Nanoparticle Res.*, **2013**, 15, 1828.
- a) Hutchings, G. J.; Brust, M.; Schmidbaur, H. *Chem. Soc. Rev.* **2008**, 37, 1759. b) Guo, S.; Wang, E. *Nano Today* **2011**, 6, 240.
- DeVries, G. A.; Brunnbauer, M.; Hu, Y.; Jackson, A. M.; Long, B.; Neltner, B. T.; Uzun, O.; Wunsch, B. H.; Stellacci, F. *Science* **2007**, 315, 358.
- (a) Lodeiro, C.; et al *Chem. Soc. Rev.* **2010**, 39, 294.