Magnetite and gold nanoparticles conjugated in a core-satellite nanostructure for biomedical applications.

D.A. Moraes[1], W. Beck Jr[1]., T. L. Silva[1] and L. C. Varanda[1]
[1]*IQSC, Universidade de S. Paulo, S. Carlos, SP, Brazil*

Recently, the great advances in the nanoscience fields and its integration with several science areas have increased amount of the technological applications. Concerning to biomedical and biotechnological fields there is much interest for multifunctional systems. In such systems, those that combine, for example, both magnetic and optical properties lead development of interesting applications such as: drug delivery, protein separation, and multimodal imaging probes, among others [1]. In this context, there are few works in the literature about multifunctional core-satellites systems, which can be a potential platform to ally different nanocomponents due to good chemical stability which such systems can provide in the conjugation of nanocomponents by chemical bonds between organic molecules presented in their surfaces [2]. Due to the great quantities of chemical and physical concepts involved in such systems and their potentials applications, this study aim is develop methods to obtain integrated systems of magnetite and gold nanoparticles by means of a core-satellite structure. Gold nanoparticles (NPs) were synthesized using a modification of the Brust method [3]. Their surfaces were coated with 11-mercaptoundecanoic acid. Magnetite NPs were synthesized using a poliol modified process [4,5] combined with the seed-mediated grow method[5]. The as-synhesized magnetite NPs surfaces were modified by ligand exchange, replacing oleylamine and oleic acid for (3-aminopropyl) trimethoxysilane (APTMS) molecules. All obtained NPs presented size and shape controlled for the conjugation step.

Keywords: Magnetite nanoparticles; gold nanoparticles; core-satellite nanostructure; biomedical applications;

Supported by agencies CNPq and FAPESP.

[1] Gao, J. H.; Gu, H. W.; Xu, B. *Accounts of Chemical Research* **2009,** *42*(8), 1097-1107.

[2] Lee, J. H.; Jun, Y. W.; Yeon, S. I.; Shin, J. S.; Cheon, J. *Angewandte Chemie-International Edition* **2006,** *45*(48), 8160-8162.

[3] Martin, L. M.; Bashan, J. I.; Chando, P.; Eah, S. K. *Langmuir* **2010,** 26(10), 7410-7417.

[4] Varanda, L. C.; Jafelicci, M. *Journal of the American Chemical Society* **2006,** *128*(34), 11062-11066.

[5] Sun, S. H.; Zeng, H.; Robinson, D. B.; Raoux, S.; Rice, P. M.; Wang, S. X.; Li, G. X. *Journal of the American Chemical Society* **2004,** *126*(1), 273-279.

damoraes15@gmail.com