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Silver nanoparticles in water treatment: the heavy metals capture

Venditti I[1], Prosposito P[2], Mochi F[2], Casciardi S[3], Capone B[1], Fratoddi I[4] and **Battocchio C[1]**
[1]University of Roma TRE, Italy
[2]Tor Vergata University of Rome, Italy
[3]INAIL, Italy
[4]Sapienza University of Rome, Italy

Chemical sensors are generally based on the concomitant presence of two elements, a recognition element (active element) sensitive to stimuli produced by various chemical compounds (analytes) and a transduction element that produces a signal whose magnitude is related, through a known relationship, to the concentration of the analyte itself. The use of silver nanoparticles (AgNPs) as active element in sensors has a recent story and the first attempts date back to the early 2000s [1]. In particular the use foe water treatment becomes very significant in the last years. AgNPs, in comparison for example with metal oxides, present numerous advantages such as a high sensitivity, a short response time, room temperature operation, the possibility of tuning both chemical and physical properties by using different capping agent. In the present work, AgNPs were prepared and their interaction with heavy metal ions was studied using different techniques. Morphological and dimensional characterizations of the AgNPs-3MPS (average size and shape) before and after the interaction with heavy metals were obtained by Transmission Electron Microscopy (TEM) and Dynamic Light Scattering (DLS) studies. Moreover, the system was investigated by means of different techniques, such as Uv-vis, Fourier Transform Infrared Spectroscopy (FTIR) and High-Resolution X-ray photoelectron spectroscopy (HR-XPS), in order to understand the mechanism of Surface plasmon resonance (SPR) sensing.

Recent Publications

1. F. Mochi, L. Burratti, I. Fratoddi, I. Venditti*, C. Battocchio, L. Carlini, G. Iucci, M. Casalboni, F. De Matteis, S. Casciardi, S. Nappini, I. Pis, P. Prosposito; Interaction of colloidal silver nanoparticles with Co2+ and Ni2+ in water for sensing application; Nanomaterials 8 (2018) 488; doi:10.3390/nano8070488

2. F. Porcaro, L. Carlini, A. Ugolini, D. Visaggio, I. Luisetto, P. Visca, I. Fratoddi, I. Venditti, L. Simonelli, C. Marini, W. Olszewski, N. Ramanan, C. Battocchio; Synthesis and Structural Characterization of Silver Nanoparticles Stabilized with 3-Mercapto-1-Propansulfonate and 1-Thioglucose Mixed Thiols for Antibacterial Applications; Materials 9 (2016) 1028 doi:10.3390/ma9121028

3. P. Prosposito, F. Mochi, E. Ciotta, M. Casalboni, I. Venditti*, L. Fontana, G. Testa, I. Fratoddi; Hydrophilic silver nanoparticles with tunable optical properties: application for the detection of heavy metals in water; Beilstein J. Nanotechnol. 7 (2016) 1654-1661. doi:10.3762/bjnano.7.157

Biography

Venditti I is a Researcher in Inorganic Chemistry in Department of Sciences at University of Rome Tre, Italy. Her scientific interests are focused in the field of micro and nanostructured materials for advanced technological applications. The preparation of such structures material used was noble metals (Au, Ag, Pt and Pd) and polymeric materials (organometallic polymers, polyenes and polyacrylates) obtained in nano micrometric dimensions and controlled shape through different approaches. These research activities have been reported in 70 papers in international peer-reviewed journals, two book chapters and two patents.

iole.venditti@uniroma3.it

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