

Production of Silver Nanoparticles by spent coffee grounds extracts

Antonio Zuorro, Gianluca Maffei, Annalaura Iannone and Roberto Lavecchia
Sapienza University of Rome, Italy

Spherical silver nanoparticles (AgNPs) were synthesized through a novel green method employing spent coffee grounds (SCG) phenolic extracts obtained with hydro-alcoholic mixtures. The bio-reduction of AgNPs was carried out at 25 °C under stirring, employing an aqueous solution of silver nitrate as a precursor and the polyphenols obtained from SCG extracts as reducing and capping agents. To monitor the formation of AgNPs, UV-Vis spectra were recorded and the intensity of the surface plasmon resonance (SPR) band of silver at 405–430 nm was measured. The synthesis of Ag NPs was completed in 5 hours. Transmission Electron Microscopy (TEM) observations showed that the AgNPs obtained exhibited a spherical shape. The mean hydrodynamic diameter and zeta-potential were measured through Dynamic Light Scattering (DLS) technique. XRD patterns were acquired to assess the crystalline structure of the AgNPs, which exhibited a cubic face centered lattice.

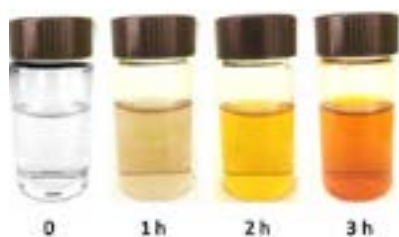


Figure: Appearance of the reaction mixture (silver nitrate solution and 50% aqueous ethanol extract from SCG) after 3 hours.

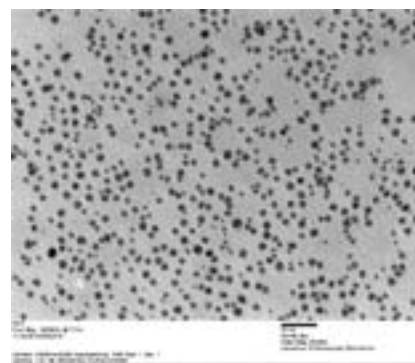


Figure: TEM imaging of AgNPs

Biography

Antonio Zuorro is working as an Assistant Professor of Chemical Engineering Fundamentals at the Department of Chemical Engineering Materials & Environment of Sapienza University of Rome, where he received his M.S. and Ph.D degrees in Chemical Engineering. His research activity has been mainly focused on the development of innovative chemical and biotechnological processes for the recovery of high value-added compounds from by-products and agro-industrial residues, such as lycopene from tomato waste and phenolic antioxidants from artichoke and bilberries waste, olive pomace and coffee grounds. He also examined the possibility of including the extracts obtained in consumer food products to get new functional foods with high antioxidant activity. In the field of enzyme technology, he studied the use of multienzyme systems with enhanced activity for the recovery of lipids and bioactive compounds with high added value from microalgae. He is the author of over 60 scientific publications and also co-author of five industrial patents.

antonio.zuorro@uniroma1.it

Notes: