GREEN SYNTHESIS OF SILVER-GOLD BIMETALLIC NANOPARTICLES USING THE HAMELIA PATENS LEAF EXTRACT

Karina del Carmen Chavez Gomez, Gerardo Antonio Rosas Trejo

Universidad Michoacana de San Nicolás de Hidalgo, Instituto de investigación en metalurgia y materiales, Mexico.

The nanoparticles (NPs) of noble metals present great interest due to their properties and as a consequence of their wide variety of applications in which they are actively used. In the nanometric scale, the properties of nanoparticles improve with respect to their micrometric counterparts, which is why they have become essential for their study in biosensors, electrocatalysis, and optical applications. Nanoparticles are not only studied due to the reduction in size but also because of the influence on their properties due to quantum confinement. These nanostructures can be configured in different ways, highlighting those of the core-shell type.

The conventional methods of synthesis for the obtaining of nanoparticles, use chemical reagents that cause harmful residues to the environment, for that reason the biosynthesis is used, which uses reagents of natural origin, like the extracts of the plants to reduce and stabilize the NPs. Consequently, the byproducts are friendly to the environment.

In this work we present the study on the biosynthesis and characterization of bimetallic NPs of Ag core-Au shell, using the extract of the Hamelia Patens plant. To achieve this objective, the strategy consisted of synthesizing Ag seeds and later growing the gold NPs taking advantage of a heterogeneous nucleation. NPs were structurally characterized by UV–vis spectrometry, X-Ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The infrared spectroscopy (FTIR) technique was also used to determine the chemical groups of the plant extract involves in the bioreduction. SEM analysis showed spherical particles with aggregation but studies as a function of reaction time indicate that the Hamelia Patens plant has inadequate quantities of stabilization agents. TEM observations show that the sizes of the bimetallic nanoparticles varied in 15 to 50 nm with an average size of 32 nm. FTIR spectroscopy confirmed the presence of phenolic compounds as the reluctant agent of the NPs.

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Presenting author’s email: ingquimica269@hotmail.com