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Javier Suárez-Cerda, Gabriel Alonso-Nuñez, Heriberto Espinoza-Gómez, Lucía Z. Flores-López

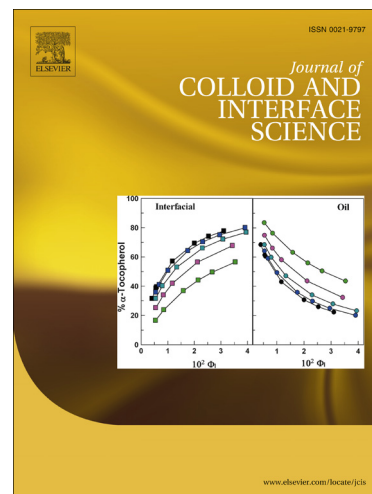
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Synthesis, kinetics and photocatalytic study of “ultra-small” Ag-NPs obtained by a green chemistry method using an extract of *Rosa 'Andeli'* double delight petals.

Javier Suárez-Cerda^a, Gabriel Alonso-Nuñez^b, Heriberto Espinoza-Gómez^c, Lucía Z. Flores-López^{a,*}

- a. Centro de Graduados e Investigación, Instituto Tecnológico de Tijuana, Apartado Postal 1166, Tijuana, B. C., Mexico
- b. Universidad Nacional Autónoma de México, Centro de Nanociencia y Nanotecnología Km. 107 Carretera Tijuana-Ensenada, C.P. 22860 Ensenada, B. C., México
- c. Facultad de Ciencias Químicas e Ingeniería, UABC, Calzada Universidad 14418 Parque Industrial Internacional, C.P. 22390 Tijuana, B.C., Mexico

* Phone: +526646233772; Fax: +526646234043; e-mail: lzflores@hotmail.com

* To whom all the correspondence should be addressed.

Abstract.

This paper reports the effect of different concentrations of *Rosa 'Andeli'* double delight petals aqueous extract (PERA) in the synthesis of silver nanoparticles (Ag-NPs), using an easy green chemistry method. Its kinetics study and photocatalytic activity were also evaluated. The Ag-NPs were obtained using an aqueous silver nitrate solution (AgNO_3) with 9.66% w/v, 7.25% w/v, and 4.20% w/v PERA as both reducing-stabilizing agent. The formation of the Ag-NPs was demonstrated by analysis of UV–vis spectroscopy, scanning electron microscopy–energy dispersive spectroscopy (SEM–EDS) and transmission electron microscopy (TEM). TEM analysis shows spherical nanoparticles in shape and size between ~0.5 to 1.4 nm.

A comparative study was done to determine which concentration was the best reducing-stabilizing agent, and we found out that “ultra-small” nanoparticles (0.5–1.1 nm) were obtained with 9.66% w/v of PERA. The size of the Ag-NPs depends on the concentration of PERA and Ag(I).

The reaction of formation of “ultra-small” Ag-NPs, proved to be first order for metallic precursor (silver) and second order for reducing-stabilizing agent (PERA).

The Ag-NPs showed photocatalytic activity, in degradation of commercial dye with an efficiency of 95%.

Key words: ultrasmall nanoparticles, green chemistry, silver nanoparticles,

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