

Agroindustrial Waste as a Source of Silica in the Production of Silica Nanoparticles

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The Agroindustrial Wastes are by-products that result from the processing of energy crops. Their incineration produces residual ash, which are deposited in landfills. Their inappropriate handling and elimination raise serious questions related with the environmental impact and human health [1]. The incentive for the reuse of waste can be a solution to this problem. Coupling the Nanotechnology in reuse of agroindustrial wastes, can be a crucial contribution on innovation and development of methodologies and products more sustainable [2]. The rice husk is a cheap, abundant and biodegradable agro-industrial waste, whose major inorganic constituent is silica (SiO_2). This waste has demonstrated high potential in the production of silica nanoparticles [3] (Figure 1).

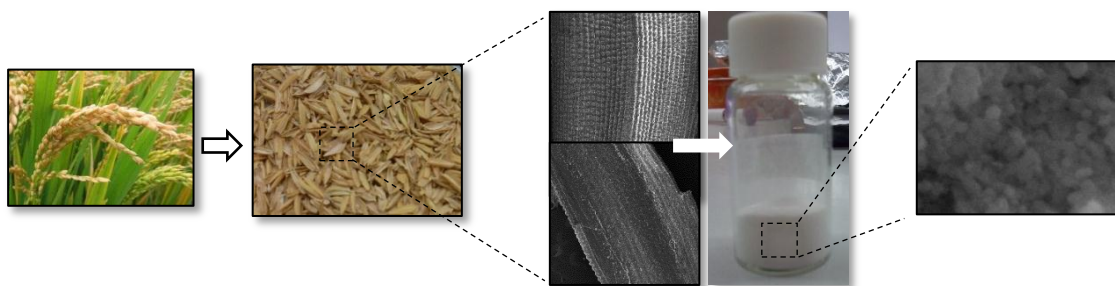


Figure 1 – Schematic representation of the preparation of the silica nanoparticles from rice husk.

This work reports the recuperation of silica nanoparticles from agroindustrial wastes by developing of economic and environmentally sustainable methodologies.

The morphology, particles size and chemical composition of the silica nanoparticles were characterized by several techniques, namely Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Energy-Dispersive X-Ray Spectroscopy (EDS), Elemental Analysis (EA), Fourier Transform Infrared Spectroscopy with Attenuated Total Reflectance (FTIR-ATR) and Thermogravimetry Analysis (TGA).

These nanoparticles are being functionalized by a post-grafting methodology with groups with functional properties.

References:

- [1] John, E., Singh, K.; *The Biofuels Handbook*, 3th ed.; Royal Society of Chemistry, 2011.
- [2] Baccile, N., Babonneau, F., Thomas, B., Coradin, T.; *J. Mater. Chem.*, **2009**, 19, 8497.
- [3] Weixing, W., Jarett C. M., Xiaotian, F., Aijie H., Zhiping L., Luyi S.; *ACS Appl. Mater. Interfaces*, **2012**, 4, 977.

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