DCE 21 4th DOCTORAL CONGRESS IN ENGINEERING

DOCTORAL CONGRESS IN ENGINEERING

Book of Abstracts

Symposium on Environmental Engineering

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of the

4th Symposium on Environmental Engineering

Editors:
Ana Gonçalves, Joana Pesqueira,
Juliana Sá, Sara Pardilhó

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Universidade do Porto, Faculdade de Engenharia, Departamento de Engenharia Química, Rua Dr. Roberto Frias s/n 4200-465 Porto, Portugal

P13. Synthesis and characterization of nanostructured carbon spheres

Luísa Vieira[1], Ana Rita L. Ribeiro[1], Rui S. Ribeiro[1], Adrián M.T. Silva[1]
[1] Laboratory of Separation and Reaction Engineering - Laboratory of Catalysis and Materials (LSRE-LCM), Faculdade de Engenharia, Universidade do Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal.

Abstract

Over the last few decades, the water contamination by organic micropollutants has raised an increasing concern due to its effects and impacts on wildlife and human health (Gorito et al. 2017). Hence, their removal from aquatic systems is necessary, with adsorption being an interesting option in treatment plants due to its simplicity and easy operation (Tripathy, Padhiari, and Hota 2020). The use of nanostructured materials as sorbents has gained significant research attention because of their advantageous performances and properties (*e.g.*, large surface area and specific affinity towards ultra-trace-level target analytes) (Khajeh, Laurent, and Dastafkan 2013).
Particularly, carbon-based nanostructured materials, as hollow carbon spheres, have been investigated due to their capacity to store substances within their inner cavities (Fuertes, Valle-Vigón, and Sevilla 2012). In the present study, carbon spheres were synthesized from silica@polymer spheres with a core@shell structure, by adapting the procedure reported by Fuertes *et al*. These structures were then thermally annealed at 800 ^{o}C to obtain silica@carbon spheres. Hollow carbon spheres were finally obtained upon etching of the silica core.
The samples were characterized using scanning electron microscopy (SEM) coupled with energy-dispersive X-ray spectroscopy (EDS) and thermogravimetric analysis (TGA). The textural properties (surface area and porosity) were obtained from nitrogen adsorption-desorption isotherms at -196 ^{o}C. It was shown that the particle size of the carbon spheres can be tuned from 120 nm to 260 nm by varying the ethanol/water ratio.

Keywords: Carbon spheres, Silica-polymer, Silica-carbon, Core-shell, Hollow spheres, Nanomaterials, Adsorption.

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