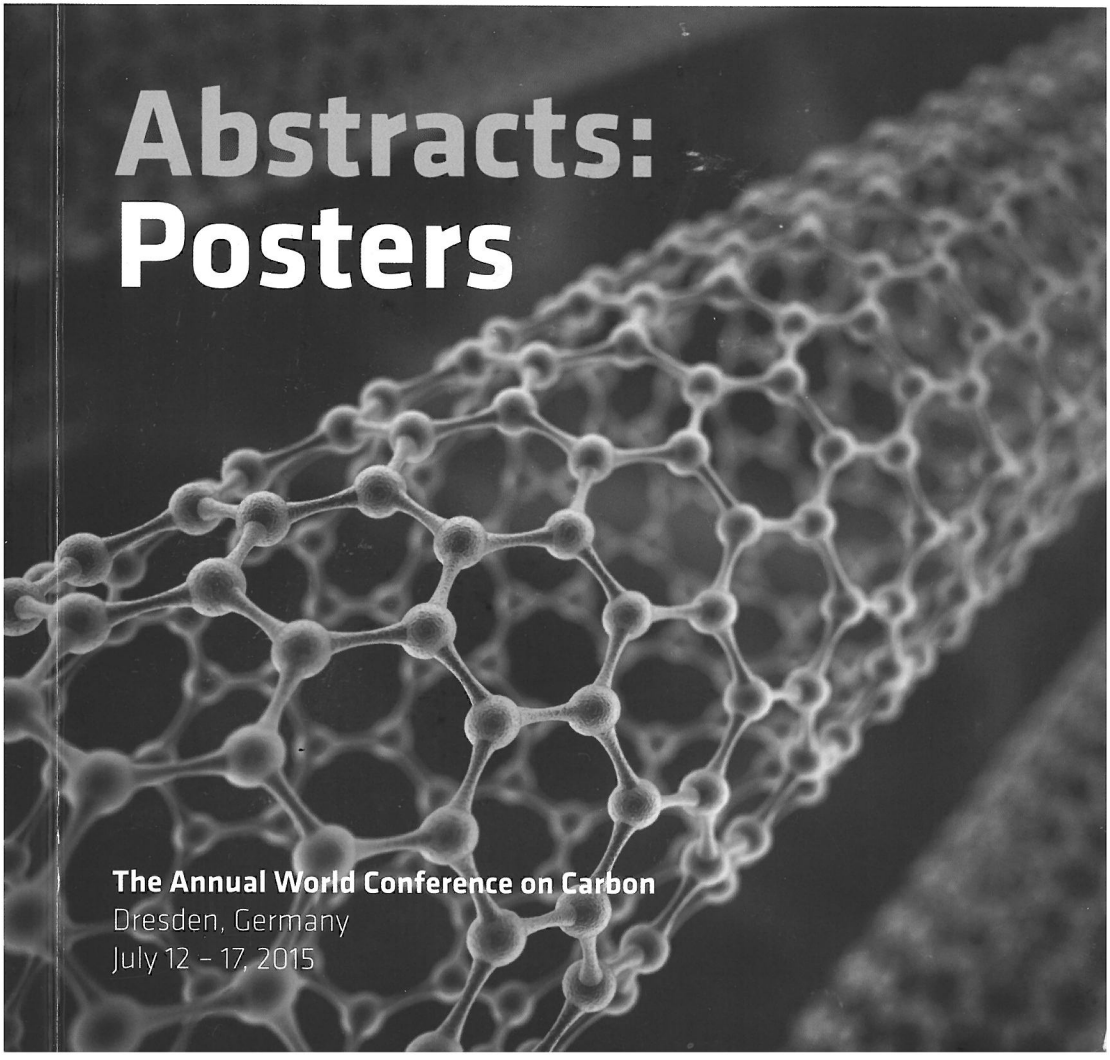
CARBON 2015

INNOVATION WITH CARBON MATERIALS



Abstracts: Posters

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Development of magnetically recoverable carbon nanocomposites for the catalytic wet peroxide oxidation of 4-nitrophenol solutions

RIBEIRO, Rui S[1]; SILVA, Adrian M T[2]; FIGUEIREDO, Jose L[2]; FARIA, Joaquim L[2]; GOMES, Helder T[1]

[1] LCM – Laboratory of Catalysis and Materials – Associate Laboratory LSRE-LCM, Department of Chemical and Biological Technology, School of Technology and Management, Polytechnic Institute of Bragança; [2] LCM – Laboratory of Catalysis and Materials – Associate Laboratory LSRE-LCM, Departamento de Engenharia Química, Faculdade de Engenharia, Universidade do Porto

Catalytic wet peroxide oxidation (CWPO) is a well-known process for removing organic pollutants from low-medium concentration (1-30 gC/L^{-1} of TOC) industrial process waters and wastewater. If homogeneous Fe^{2+} is used as catalyst, the process is often called as Fenton process. Despite the high catalytic activity, this approach usually requires a final separation step to recover the Fe ions present in the treated water, increasing the treatment costs. To overcome this problem, several carbon materials have been reported as supports for heterogeneous immobilization of iron, some being referred as active on their own for CWPO. Metal-free carbon materials still lack catalytic activity in comparison with metal-based catalysts. However, combination of the two phases can lead to magnetically recoverable nanostructured carbon composites to serve as catalysts for CWPO – with *in-situ* magnetic separation representing an additional advantage to the process. The main goal of this approach is to develop highly active heterogeneous catalysts, with stable properties against leaching of the metal phase, and easily recoverable for catalyst reuse. In this context, magnetic materials with different properties were synthesized, namely magnetite, magnetic graphitic nanocomposites (prepared by hierarchical co-assembly of copolymer F-127, resols and magnetite, followed by pyrolysis), and magnetic carbon xerogel composites containing magnetite, nickel or iron (prepared through metal phase addition during the polymerization process). The performance of these materials was investigated in CWPO of 4-nitrophenol (4-NP, 5 $g\ L^{-1}$) as non-biodegradable model pollutant, resulting in 4-NP conversion and TOC removal of 100% and 76%, respectively.

Presenter
Ribeiro, Rui
rui.ribeiro@ipb.pt

Organization/Company
LCM – Laboratory of Catalysis and Materials – Associate Laboratory LSRE-LCM Department of Chemical and Biological Technology, School of Technology and Management, Polytechnic Institute of Bragança

Campus de Santa Apolónia
5300-857 Bragança
Portugal

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