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## Oxidative desulfurization of organosulfur compounds in a model mixture of scrap tire pyrolysis oil using the ionic liquid [BMIM]BF<sub>4</sub> on ZSM-5 zeolite

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In this work, composite materials based on zeolites have been prepared by impregnating ZSM-5 zeolite powders with the ionic liquid (IL) BMIM[BF<sub>4</sub>] in three IL/zeolite weight ratios (0.1, 0.5, 1). The prepared materials were employed as catalysts to remove sulphur from two model mixtures of scrap tire pyrolysis oil (STPO) by oxidative desulphuration (ODS). ZSM-5 zeolite was outgassed in an inert atmosphere at 220°C for 24 hours, the ionic liquid impregnation employed dichloroethane as solvent at 40°C for eight hours and finally, the excess of IL was removed by Soxhlet extraction with toluene at 140°C for five hours. The structural and physicochemical properties of materials were characterized by XRD, IR spectroscopy, surface area BET and TGA. Besides the surface area reduction, the characterization results show that the ionic liquid is successfully anchored on the zeolite whose framework is not modified. Different reaction systems (ZSM-5; ZSM-5/H<sub>2</sub>O<sub>2</sub>; IL; IL/H<sub>2</sub>O<sub>2</sub>; IL/ZSM-5/H<sub>2</sub>O<sub>2</sub>) were used to investigate the ODS reaction of the STPO (S content about 2700 ppm). The catalytic activity was carried out in a batch reactor using a model mixture consisting of toluene, benzothiazole/dibenzothiophene and using hydrogen peroxide as oxidant agent. The sulphur compounds were found to exhibit a high stability to the oxidation in absence of the catalyst and H<sub>2</sub>O<sub>2</sub>. Preliminary essays were done using a constant oxidant/oil volume ratio and temperature at 0.5% v/v and 75°C, respectively. The ODS evaluation results show that the desulphurization activity is affected by the nature of the sulfur molecules (size and polarity).

### Recent Publications:

1. García V, Caldes M T, Gautron E, Joubert O, Mondragón F, et al. (2010) Methane oxidation by lattice oxygen of Ni/BaTi<sub>1-x</sub>In<sub>x</sub>O<sub>3</sub> δ- catalysts. *Catalysis Today* 157:177–182.
2. García V, Fernández J J, Ruíz W, Mondragón F and Moreno A (2009) Effect of MgO addition on the basicity of Ni/ZrO<sub>2</sub> and on its catalytic activity in carbon dioxide reforming of methane. *Catalysis Communications* 11:240–246.
3. García V, Caldes M T, Joubert O, Sierra G, Batiot C, et al. (2008) Dry reforming of methane over nickel catalysts supported on the cuspidine-like phase Nd<sub>4</sub>Ga<sub>2</sub>O<sub>9</sub>. *Catalysis Today* 133:231–238.

### Biography

Verónica García is Professor at the Universidad Industrial de Santander, Colombia. She has obtained her PhD from Nantes University, France and Universidad de Antioquia, Colombia in 2010 and held a Post-doctoral position at the University of the Basque Country, Spain from 2015–2016.

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