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In- situ transformation of municipal sewage sludge into biodiesel

R Sánchez-Vázquez, I A Vasiliadou, Juan A Melero, F Martínez, L Fernando Bautista, J Iglesias, G Morales and R Molina
Universidad Rey Juan Carlos, Spain

Biodiesel production is gaining attraction as an efficient alternative for the valorization of sewage sludge. This waste, which can be considered as a raw material, contains significant quantities of free lipids (10-30 wt%) liable to be transformed into biodiesel. Nevertheless, the low-quality of this feedstock makes necessary the use of novel conversion technologies, such as heterogeneous acid catalysis. This contribution deals with the extraction of lipids from primary and secondary sewage sludge collected from a wastewater treatment plant and their use in the synthesis of biodiesel over highly poison-resistant heterogeneous acid catalyst based on SBA-15-supported zirconium. Catalytic tests were performed in a 25 mL stainless-steel autoclave. The sludge was treated with different organic solvents to extract the lipids which were subsequently transformed into biodiesel over Zr-SBA-15 (two-step process). Alternatively and advantageously, similar experiments were carried out using directly the dried and wet sludge, without previous extraction (*in-situ* process). Zr-SBA-15 catalyst provided high biodiesel yields when processing primary and secondary sewage sludge in both the 'two-steps' and the '*in-situ*' processes, converting almost 95% of the saponifiable fraction (free fatty acids and triglycerides) into fatty acid methyl esters (FAME). It must be noted that such good catalytic results are obtained even in the presence of high amounts of unsaponifiable matter and other impurities, typically accompanying such wastes. Besides, the excellent results (92%) obtained with wet (non-previously dried) sludge in the *in-situ* process demonstrate the high water tolerance of the Zr-SBA-15 catalyst, allowing to avoid the necessity of a sludge drying pretreatment.

Biography

R Sánchez-Vázquez received her PhD in 2013 from Universidad Rey Juan Carlos of Madrid working on biodiesel production by heterogeneous acid catalysts. She undertook a Pre-doctoral research in the group of Prof. Adam Lee and Karen Wilson at Cardiff Catalysis Institute working on the synthesis of mesoporous Zr-SBA-15 hybrid materials for biodiesel production. She carried out a Postdoctoral research in European Bioenergy Research Institute working on isosorbide production. She has published 10 papers in reputed journals and her teaching experience has been developed entirely at Universidad Rey Juan Carlos with different graduate and Postgraduate teaching responsibilities.

rebeca.sanchez.vazquez@urjc.es

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