# BIOFUEL PRODUCTION BY PHOTOCHEMICAL CRACKING OF VEGETABLE OILS EMPLOYING AROMATIC IMIDES SUPPORTED ON MESOPOROUS SILICATES AS SENSITIZERS

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Catalytic cracking is a key reaction in the petrochemical industry, allowing the conversion of high molecular weight hydrocarbons into low molecular weight fuel. On the other hand, catalytic cracking of vegetable oils can be used to obtain biodiesel, which is an alternative to the transesterification reaction. The use of photochemistry in cracking reactions, however, has remained largely unexplored. In the present work, the development of photochemical catalysis as a method for the cracking of vegetable oils has been pursued. For this goal, aromatic imides, such as 1,8-naphthalimides, 1,4,5,8-naphthalenediimides and 3,4,9,10-perylenediimides, were employed as photosensitizers. The imides were immobilized by covalent grafting onto the surface of silicates MCM-41 and SBA-15, which are mesoporous nanostructured materials synthesized in the presence of surfactant micelles. The modified particles were characterized by UV/visible, fluorescence and infrared spectroscopy, as well as x-ray scattering and thermogravimetric analysis (TGA). The catalytic activity of the new materials was tested by mixing small amounts of the modified particles with soy oil, following by pyrolysis in a TGA microbalance. It was found that the temperature necessary for the cracking of the soy oil was lower by approximately 50 $^{o}$C in the presence of the catalysts. In the absence of catalyst, the soy oil burned in the range 350 – 500 $^{o}$C. In the presence of mesoporous silicate SBA-15, on the other hand, pyrolysis of the oil occurred in the range 300 – 450 $^{o}$C. The presence of the imides, with or without irradiation with UV light (laser at 460 nm), did not have any detectable effect on the combustion temperature. The absence of photochemical stimulation can be attributed to the low power output of the laser employed. We are presently testing the pyrolysis with the photocatalysts using a more powerful irradiation system, consisting of a high pressure Hg lamp.

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