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## Bio-inspired heterogeneous catalyst for sustainable biofuel production

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One of the challenges in the current technology generation in biofuel production is derived from their reliance on the use of hazardous and corrosive chemicals such as NaOH, KOH, HCl, H<sub>2</sub>SO<sub>4</sub> etc. as catalysts or during purification steps. Owing to the advantages of heterogeneous catalysts in terms of separation and reusability over the traditionally used homogeneous catalyst, the research has now been focused on the use of heterogeneous catalysts in recent years. In order to make the process fully “green”, researchers are trying to prepare catalysts from renewable sources such as biomass. Within this concept, bio-based CaO and Carbon based catalysts were recently introduced. We have extensively worked with both types of catalysts for the last few years. Ba and Li were also doped with bio-based CaO derived from waste shells of *Turbonilla striatula* and egg shell derived CaO respectively. In preparation of Carbon based solid acid catalyst, activated carbon produced from oil-cake waste was sulphonated by 4-Benzenediazonium sulfonate to increase the acidity and the catalyst was employed against esterification/transesterification reactions for converting acid oils extracted from non-edible seeds to biodiesel. In another experiment, multifunctional mesoporous solid acids were prepared by the sulfonation of carbonized de-oiled seed waste cake, a solid waste from biodiesel production. The catalyst was employed against two reactions of interest in biomass conversion: Cellulose saccharification (glucose yield 35–53%) and fatty acid esterification (conversion upto 97%) outperforming H<sub>2</sub>SO<sub>4</sub>, conventional solid acids (zeolites, ion-exchange resins etc.) as well as sulfonated carbons reported earlier works. This led us to conclude that the applicability of the basic bio based-CaO is until so far restricted to trans-esterification only. The carbon based catalysts are more versatile in this sense due to the following points; (i) they can be made from any carbon source (agro-industrial residues, post crop harvest residues etc.) (ii) Their physicochemical and structural properties can be easily tuned by altering and fine-tuning the preparation conditions and (ii) they can be easily modified with metals, acids or bases through impregnation or functionalization aiming for various catalytic applications.

### Biography

D Deka, Professor is currently serving as a Head of the Department of Energy and Principal Investigator of the biomass conversion laboratory, Tezpur University India. He earned his PhD from Tezpur University in 2004. He is having over 20 years of teaching experience and has supervised many PhD students. His research interests include biofuels, biomass conversion, catalytic aspects of biofuels production and value added products from biomass.

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