

5th World Bioenergy Congress and Expo

June 29-30, 2017 Madrid, Spain



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Converting waste products into fuel and useful chemicals

In this presentation, the possibility of converting low-grade vegetable oil or tallow available widely in New Zealand into biodiesel and energy materials will be discussed in an effort to improve the economy of this process. Currently, established processes use alkali catalysts such as sodium hydroxide to transesterify any source of lipid using methanol at low temperatures and pressures. However, the manufacturing cost of biodiesel produced remained high, making biodiesel more expensive than petroleum diesel, especially if high grade feedstock is used. Three possible approaches, which may improve the conversion of low grade lipid into biodiesel or useful chemicals, will be discussed in this presentation: (1) development of gas phase reactor in which the transesterification reaction takes place only in few seconds rather than many minutes. This is done by spraying the oil or molten tallow into fine droplet against methanol vapor at elevated temperatures, (2) react glycerol, which is a waste product from the biodiesel manufacturing, with the free fatty acid present in the low grade tallow or oil according to the esterification reaction shown. The produced monoglycerides can then be easily transesterified. This will prevent the harmful saponification reaction, which could consume the catalyst, and (3) use of higher alcohol having higher solubility of the lipid to ease biodiesel production and also to produce energy materials, known as a phase change materials, that can be used to improve energy managements in buildings. In addition the potential of growing and harvesting algae in wastewater for the production of biodiesel will be also discussed.

Biography

Mohammed M Farid has completed his BE in Chemical Engineering from the University of Baghdad (1971), ME and PhD in Chemical Engineering from University of Swansea, Wales (1975 and 1977). He is Fellow of the Institution of Chemical Engineers, has published more than 380 papers in international journals and refereed international conferences, 6 patents, 5 books, and 11 chapters in books. He has received a number of international awards such as the Matsumae International Fellowship (1986), the Hisham Hijawi Award (1993) and the Marie Curie Fellowship (2010). In 2010, he was short listed and came in the third place for the IChemE Innovator of the Year Award – sponsored by NES in the UK. He was invited as a keynote speaker to a large number of international conferences and to be in the editorial board of international journals.

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