Fuel

Biodiesel production fromUlva linza, Ulva tubulosa, Ulva fasciata, Ulva rigida, Ulva reticulate by using Mn2ZnO4 heterogenous nanocatalysts

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Abstract

Seaweeds are found abundance in most seashores. They contain relatively high lipid contents and are exhibiting medicinal properties. The present work focused on the use of seaweed species Ulva linza, U. tubulosa, U. fasciata, U. rigida, and U. reticulate to synthesize Mn2ZnO4 composite nanoparticles. The later was utilized for biodiesel production and its antibacterial potential was also assessed. Heterogeneous mixed metal oxides are suitable catalysts for biodiesel production due to ease of separation, reusability and environmental friendliness. The employment of multi-resistant organisms (MROS) is of major importance in modern medicines. Thus there is an extreme need for potential antibacterial alternatives such as metal oxides. Mn2ZnO4 nanoparticles were synthesized by using a co-precipitation method. The crystalline behavior and morphological characterizations were carried out through XRD, FE-SEM, Raman Spectra and FT-IR respectively. The particle size was found to be 42 nm. Fatty Acid Methyl Ester (FAME) produced from Ulva species was analyzed by gas chromatography and physical parameters were also determined. The yields were as follows: U. linza 72.3%, U. tubulosa 72%, U. fasciata 70.6%, U. rigida 70.4%, and U. reticulate 71.5%.

The antibacterial potential of synthesized Mn2ZnO4 nanoparticles after transesterification, showed strong antibacterial activity against both gram positive and gram negative bacteria and were found to be comparable to commercially available antibiotics. To assess their antibacterial efficiency, the minimum inhibition concentration was measured. The used catalysts exhibit high efficient catalytic activity on degrading methylene blue under UV irradiation.