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Biodiesel Production from Non-Edible Oil Seeds Using Nanocatalyst: A Review

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Abstract—*Biodiesel has gained attraction as an alternative fuel in the recent years due to its renewable, non-toxic, bio-degradable and better gas emission properties. It is produced by transesterification process in which fat or oil is allowed to react with an alcohol (methanol or ethanol), usually in the presence of a suitable catalyst. In biodiesel production selection of feedstock plays an important role which, in turn, contributes to the total cost of production. By converting edible oils into biodiesel, food resources are actually being converted into automotive fuel which may bring global imbalance to the food supply and demand market. Therefore, research work have been done to produce biodiesel by using alternative or greener oil resources like non-edible oil seeds as they contain high amount of free fatty acids. Next to feedstock, catalyst plays an important role in biodiesel production. The catalyst used can be heterogeneous or homogeneous. But homogeneous catalyst results in the formation of soap during the transesterification process and hence an additional treatment is needed to remove the soap which in turn increases the total production cost. Heterogeneous catalytic transesterification have many advantages over homogeneous transesterification such as the catalyst can be recycled, lesser amount of waste water produced and separation of biodiesel from glycerol is easier. But most heterogeneous catalyst require high reaction time, high reaction temperature and low catalytic stability which gives low yield of product due to slow reaction rate. Nanomaterials with high specific surface area and high catalytic surface can overcome the problems associated with heterogeneous catalyst such as mass transfer resistance, fast deactivation, inefficiency and time consumption by achieving optimal operating conditions. The use of nanocatalyst shows higher catalytic activity that produces improved biodiesel fuel, with reduced particulate matter emission characteristics at low cost.*

Keywords*: Biodiesel, Nanocatalyst, Transesterification.*