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## The effect of KOH catalyst concentrations supported on micro spherical mesostructured γ-$Al_2O_3$ in biodiesel production from waste cooking oil

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The world's increasing demand for energy due to the industrial development, population enhancement and economic growth necessitate finding new energy resources. Fossil fuels have severe limitations for this purpose such as the decent volume of resources and pollution problems. The application of biodiesel plays an important role in pushing back these limitations. Waste cooking oil is one of the potential feed stocks for biodiesel production which is not only leads to low-cost biodiesel production but also reduces the cost of waste products removal and treatment. The scope of this study is investigating the effects of different concentration of KOH/γ-$Al_2O_3$ as base catalysts for biodiesel production. The microspherical mesostructured γ-$Al_2O_3$ support has been synthesized and impregnated with various concentration of KOH. In order to determine the best catalyst concentration for biodiesel production, a series of experiments were carried out by using methanol/WCO molar ratio of 8, catalyst concentration between 4-8% and a temperature of 60° C as the transesterification reaction parameters. The support and catalysts have been characterized by XRD, BET and SEM techniques. TGA analysis has been implemented for the produced biodiesel samples. The obtained results clearly show the highest conversion of 99% for 6% KOH catalyst. The results revealed highly potential of theses catalysts to be used for biodiesel production.

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## The design and manufacture of renewable ocean energy capture system

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To reduce impacts of energy shortage and sustain developments of the human society, exploring all kinds of renewable energy becomes an urgent task. Taiwan has started to develop offshore renewable energy to replace fossil fuels and has been satisfying most of the energy consumption over the decades. Kuroshio passes through the east coast of Taiwan, and the water depth in this region is about 500~1000 m. The floating and submerged platform system is suitable for deep water area and good for any water depth. This study is one of the subprojects of an integrated project: "A Study on Harvesting Marine Current Power". The main goal of the study is the analysis and design of the second version of the submerged energy capture system which includes the shroud, diversion wing and the rudder. This design can increase the pressure gradient between the inflow and outflow and the flow velocity inside the shroud can be enhanced, thus improving the efficiency of the turbine. The attack angle of the wing can be adjusted to control the lifting of the platform system. While, the rudder is used to control the flow direction be always perpendicular to the entrance face of the capture system. The optimal design is verified by the numerical simulation and experimental measurement. The project will match the integrated projects (four other subprojects) which will complete the design and construction of a prototype of the marine floating structure system and the implementation of the Kuroshio Energy collection might be fulfilled in the near future.

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