



## Bio-diesel Fule(BDF) Synthesis by Using Ion Exchange Resin Based on Ultrasonic Irradiation and Its Application

Ning, Zhu<sup>1\*</sup>, Mingchi Kuo<sup>2</sup> and Chung Hsin Han<sup>2</sup>

<sup>1</sup> Shizuoka Institute of Science and Technology, 2200-2 Toyosawa, Fukuroi,4378555, Japan

<sup>2</sup> Graduate School of Shizuoka Institute of Science and Technology, 2200-2 Toyosawa, Fukuroi,4378555, Japan

\* Ning Zhu: zhuing@me.sist.ac.jp, Tel:+81-538-450232, Fax: :+81-538-450120

**Abstract.** So far, a method of using employing ultrasound irradiation for BDF synthesis has been suggested. However, since a large quantity of water is need to wash the BDF produced, it is very important to develop a new method based on the solid catalysis, by which water-washing is not necessary, During past two years, prepared zeolites were employed as solid catalysts to synthesize BDF and BDF yield ratio up to 62% was obtained. At current paper, in stead of zeolites, ion exchange resin(IER) is used as the catalysts for BDF production. At first, ion exchange resin is prepared to increase its basic characteristics. Secondly, the basic characteristics of the prepared ion exchange resin is characterized by using SEM and X-ray diffractometer. Thirdly, BDF synthesis experiment is carried out by using the prepared IER based on ultrasonic irradiation. Finally, diesel engine performance test is carried out to investigate the thermal efficiency and exhaust gas concentration It is found that BDF yield ratio reached 44.4% when IER was prepared under the condition of 6mol NaOH preparation.

**Keywords:** Ion exchange resin, BDF synthesis, Solid catalyst, Engine performance test, Exhaust gas concentration