CHAPTER I
INTRODUCTION

The burning of fossil fuels contributes to global warming, which is a problem in our world today. Biojet fuel from non-edible oil is the solution because it is environmental friendly and promising source of energy to replace petroleum-based aviation fuels.

Biofuels derived from animal fats and vegetable oils are one of the renewable fuels. Among all feedstocks, jatropha oil is the best choice because its seed contains high oil contents and the fruit is non-edible thus the prices are uncompetitive compared to food source. In addition, there is no concern of food-fuel issue.

Biojet fuel gains attention since the International Air Transport Association (IATA) announced that all airlines must reduce their emissions by including at least 10% of bio-derived fuel in the jet fuel by 2017 (2009).

Microporous materials are known for their ability to crack various compounds of high molecular weight. Microporous zeolites such as HY, Hβ and HZSM-5 have been used for cracking of various compounds since many decades for their attributes such as high acidity and good thermal stability. However, their small pore openings make it difficult for the entry of bulky molecules such as triglycerides. This has led to the development of mesoporous catalysts with large pore opening that facilitates the entry and deoxygenation of triglyceride molecules. The combination of these micro and mesoporous materials in these composite catalysts with core-shell arrangement has the advantages of both micro and mesoporous catalysts.

The typical process for producing biojet fuel is via hydrodeoxygenation of triglycerides followed by hydrocracking, hydroisomerization reaction. In our previous studies the suitable catalysts for the two reactions were Pd/TiO_2 and Pt/HY respectively. When two catalysts combined into Pt/HY^{core}-Pd/TiO_2^{shell} catalyst, the reactors, utilities, and processes are reduced, thus lowering the total cost of production dramatically.

The purposes of this work are to study and optimize the process of converting jatropha oil into biojet fuel using prepared core-shell catalysts. The pore size, shell composition, and reaction condition were optimized to obtain the highest biojet fuel yield.