

# Structural and Morphological Improvement of Silica-Alumina-Phosphate Nanostructure by Hard Template Addition Applied in Green Fuel Production

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#### Abstract:

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> The increase in the consumption of fossil fuels and environmental pollution caused by these fuels have been prompted researchers to produce renewable biodiesel fuels. Due to the high cost of biodiesel production, suitable catalyst design is highly efficient to increase efficiency and reduce biodiesel production time. The main objective of this research is to synthesize of Silica-Alumina-Phosphate nanostructure by hydrothermal method and to improve its structure in order to produce biodiesel by esterification reactions of free fatty acid. The fatty acid contained in the oil does not penetrate the Ce/SAPO-34 pores because of its large molecular size. To solve the penetration problem, the texture of the Ce/SAPO-34 was modified by the use of activated charcoal, and therefore meso and macro pores were formed in its structure. 4 wt.% of activated charcoal was determined to achieve a catalyst containing more meso and macro pores. Synthesized catalysts were evaluated by XRD, FESEM, BET/ BJH analysis. The BET analysis showed that 4 wt.% of activated charcoal is the optimal amount of the hard template. The results of the reactor test showed that the synthesized nanocatalyst has the ability to convert 94% of the free fatty acid into biodiesel. The synthesized catalyst resulted in a conversion rate of 83% after 5 times of recovery, still maintaining its crystallinity.

#### **Biography:**

Hossein Zainalzadeh is a Bachelor of Science degree student in Chemical Engineering at Sahand University of Technology and will complete his undergraduate degree on September 30, 2019. He was a member of the Nanotechnology and Science Committee for one year and teaching assistant (TA) in the "Fluid Mechanics" course for two semesters from October 1, 2018 to June 17, 2019. During his education, Hossein was one of the two undergraduate students who could enter the research centers as a research assistant (RA). Hossein has been working as a researcher under the supervision of Professor Mohammad Haghighi for three years. His research areas of interest are CO Oxidation, Hydrogen and Biodiesel production, designing and synthesis of nanostructure catalysts. Hossein's B.Sc thesis focused on the biodiesel production over SAPO-34. Last summer, Hossein worked as an intern at Khoy Combined Cycle



Power Plant. Presently he is planning to study M.Sc. in the related fields.

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