THEORETICAL AND EXPERIMENTAL STUDY OF Pt-Co CLUSTER SUPPORTED ON TiO₂ AS CATALYST FOR PRODUCE 2,5-DIMETHYLFURAN (DMF) FROM 5-HYROXYMETHYLFURFURAL (HMF)

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Substitution of the fossil fuels for alternative energy sources is a priority for the energetic security of our region because the petroleum is now unavailable; these sources could be in short time, substituted for alternative energy sources as biofuels obtained biomass. Developments of biofuels can be accelerated because while our government is trying of to decide for any bidding of direct deep extractions of petroleum, in our region there is a wide variety of agricultural materials considered as waste which can be transformed to biofuels. Therefore, production of 2,5-Dimethylfuran (DMF) like an ideal substitute of conventional gasoline should be achieved because it has an energy content like that of gasoline. To produce DMF, certain catalysts are required; using noble metals limits their application as catalysts in the production of DMF due to their high price and low abundance in nature and also their catalytic efficiency that is not always but it's the general of the time, the highest found. One option is using bimetallic catalysts where a non-noble metal contributes with their properties and permit to keep the catalytic activity of noble metal. For that, we have developed a material kind Pt-Co supported on TiO₂ (Pt-Co/TiO₂) with low amount of Pt to produce DMF. Characterization with XRD, electron microscopy SEM and HRTEM confirmed a nanostructured material with low proportion of Pt (1wt%). Through theoretical calculations first principles the interaction between 5-Hydroxymethylfurfural (HMF) and Pt-Co/TiO₂ was studied. Catalyst activity was proved as well and conversion efficiency of HMF to DMF was determined.

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