

Development of Pd Supported Catalysts to Be Used in a Microscale-based Reactor for the Conversion of Palm Oil to Biohydrogenated Diesel

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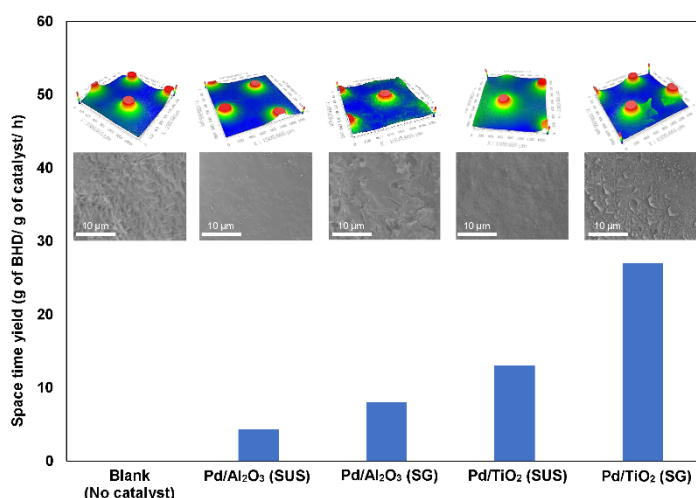
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Microscale-based reactor is considered for chemical reaction processes because it can reduce mass and heat transfer problem, increase surface to volume ratio, and decrease capital and operating expenses. In this research, Pd/Al₂O₃ and Pd/TiO₂ catalysts prepared by different coating slurries—suspension (SUS) and sol-gel (SG)—were investigated for the deoxygenation of palm oil to produce biohydrogenated diesel (BHD) in a microscale-based reactor. The coated catalysts were tested by several techniques including 3D-optical profiler measurement, SEM-EDX, XRD, BET, and adhesion test. The results show that Pd/Al₂O₃ and Pd/TiO₂ coated by suspension method provided a homogeneous layer while sol-gel method gave a non-homogeneous cracked layer. The catalyst activity testing was carried out for 8 h at 325 °C, 500 psig, H₂/feed molar ratio of 96. Among the catalysts tested, the Pd/TiO₂ synthesized by sol-gel method exhibited the highest space time yield (STY) of BHD (g BHD/ g catalyst/ h) which is due to its unique characteristic of pure anatase phase and strong metal-support interaction for hydrogen spill-over mechanism.

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Comparison of catalytic activity over Pd-supported catalysts in term of space time yield.

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