Highly selective and stable ZnO-supported bimetallic RuSn catalyst for the hydrogenation of octanoic acid to octanol

Hidajat Marcel Jonathan, 윤광남[1], 황동원[1,†]
한국화학연구원/과학기술연합대학원대학교;
[1]한국화학연구원
(dwhwang@krict.re.kr[†])

The selective conversion of octanoic acid to octanol over bimetallic RuSn/ZnO in a fixed-bed continuous reactor system is reported. Almost complete conversion (99.4 %) of octanoic acid was achieved, with a remarkably high selectivity to octanol (93.0 %), when using specific reaction conditions (300°C, a weight hourly space velocity (WHSV) of 2 h^{-1}, and 30 atm H_2). Characterizations of the catalysts revealed that the addition of Sn to Ru/ZnO resulted in the formation of a Ru_3Sn_7 alloy phase as well as SnO_x. Comparison with Ru/ZnO catalyst gives an insight that the presence of Ru_3Sn_7 alloy was most likely the active site and it significantly improved the hydrogenation activity and selectivity to octanol. The SnO_x and ZnO favored the formation of octyl octanoate by esterification of the formed octanol and octanoic acid, although it was successfully suppressed by optimizing the reaction conditions. Long-term stability tests revealed that RuSn/ZnO retained its activity for 1000 h with no coke formation. This study reveals the potential of RuSn/ZnO for the valorization of medium-chain fatty acids into value-added chemicals.