Single-step hydroconversion of triglyceride into biojet fuel using CO-tolerant PtRe/USY catalyst

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We demonstrated successful production of high-quality biojet fuel through single-step hydroconversion of triglyceride. The main idea was to design a CO-tolerant metal/acid bifunctional catalyst, which can carry out ideal hydrocracking even in the presence of CO, a strong poison of metal. Such an idea was accomplished by supporting Pt-Re bimetals on ultra-stable Y (USY) zeolite. PtRe/USY showed CO-tolerance because it had weakened CO binding and enhanced methanation activity when it compared to monometallic Pt/USY. In the hydrocracking, PtRe/USY catalyst exhibited suppressed overcracking and negligible deactivation through coke formation. Notably, PtRe/USY is intrinsically a poor hydrocracking catalyst under pure H_2 atmosphere because of its high hydrogenolysis activity. However, H_2O and CO produced in situ during deoxygenation of triglyceride selectively suppressed hydrogenolysis, thereby making PtRe/USY a highly stable and selective catalyst for producing biojet fuel.