One-pot Strategy for Fabricating Ni-CeO_2 Catalyst for Efficient Dry Reforming of Methane

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Dry reforming of methane (DRM) involves the reaction between two greenhouse gases (CH_4 and CO_2) to produce syngas (CO + H_2) at equal molar ratio, which can be further utilized for producing valuable materials through Fischer-Tropsch reaction. Ni-based catalysts are considered to be the most promising candidates towards the DRM reaction, however, the catalytic stability is still insufficient for commercial applications. Especially, the catalyst suffers from degradation under the long-term operating conditions due to the serious coke formation. Herein, the one-pot strategy is employed for synthesizing Ni-CeO_2 catalysts in the presence of citric acid, where it played key roles in enhancing the dispersion of Ni on the CeO_2 support, and hence minimizing the coke deposition. The synthetic approach employed in this study has been proved to be superior to the other conventional impregnation methods. The catalyst has been characterized by X-ray diffraction, BET surface area, transmission electron microscopy, X-ray photoelectron spectroscopy, H_2-temperature programmed reduction, NH_3-temperature programmed desorption, and so on.