

A Facile Synthesis Strategy of Saccharine/TiO₂ Composite Heterojunction Catalyst for CO₂RR

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Abstract : Currently, there is a list of catalysts that can reduce CO₂ to valuable chemicals and fuels, among them metal oxides such as TiO₂, known as promising photocatalysts to produce hydrogen and CO unless they are at an earlier age and still need to promote activity to able for produce fabricated values. Herein, in this work, we provided a novel, facile and eco-friendly synthesis strategy to synthesize more effective TiO₂-organic composite materials to selectively reduce CO₂ to CO. In this experiment, commercial nanocrystalline TiO₂ and saccharin with Li (LiBr, LiCl) were synthesized using the facile physical grinding in the mortar pestle for 10 minutes, then added 10 mL of deionized water (18.2 megaohms) on the 300mg composite catalyst before samples moving for hydrothermal heating for 24 hours at 80 C in the oven. Compared with nanosized TiO₂, the new TiO₂-Sac-Li indeed displays a high CO generation rate of 70.83 μmol/g/h, which is 7 times higher than TiO₂, which shows enhancement in CO₂ reduction and an apparent improvement in charge carrier dynamic. The CO₂ reduction process at the gas-solid interface on TiO₂-Sac-Li composite semiconductors is investigated by functional calculations and several characterization methods. The results indicate that CO₂ can be easily activated by the TiO₂-Sac-Li atoms on the surface. This work innovatively investigates CO₂ reduction in novel composite materials and helps to broaden the applications of composite materials semiconductors.

Keywords : green chemistry, green synthesis, TiO₂, photocatalyst

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