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A Facile Synthesis Strategy of Saccharine/TiO_2 Composite Heterojunction Catalyst for Co_2RR

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Abstract : Currently, there is a list of catalysts that can reduce CO_2 to valuable chemicals and fuels, among them metal oxides such as TiO_2, 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 TiO_2-organic composite materials to selectively reduce CO_2 to CO. In this experiment, commercial nanocrystalline TiO_2 and saccharin with Li (LiBr, LiCl) were synthesized using the facile physical grinding in the motel 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 TiO_2, the new TiO_2-Sac-Li indeed displays a high CO generation rate of 70.83 μmol/g/h, which is 7 times higher than TiO_2, which shows enhancement in CO_2 reduction and an apparent improvement in charge carrier dynamic. The CO_2 reduction process at the gas-solid interface on TiO_2-Sac-Li composite semiconductors is investigated by functional calculations and several characterization methods. The results indicate that CO_2 can be easily activated by the TiO_2-Sac-Li atoms on the surface. This work innovatively investigates CO_2 reduction in novel composite materials and helps to broaden the applications of composite materials semiconductors.

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