

原位合成钴/还原氧化石墨烯纳米粒子催化氨硼烷制氢

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In situ Synthesis of Reduced Graphene Oxide Supported Co Nanoparticles as Efficient Catalysts for Hydrogen Generation from NH₃BH₃

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Experimental details

Chemicals

Ammonia borane (NH_3BH_3 , AB, Aldrich, 90%), Cobalt chloride hexahydrate ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$, Sinopharm Chemical Reagent Co., Ltd., $\geq 99\%$), potassium permanganate (KMnO_4 , Sinopharm Chemical Reagent Co., Ltd., $\geq 99\%$), hydrogen peroxide (H_2O_2 , Sinopharm Chemical Reagent Co., Ltd., $\geq 30\%$), sulfuric acid (H_2SO_4 , Sinopharm Chemical Reagent Co., Ltd., 95~98%), hydrochloric acid (HCl , Beijing Chemical Works, 36%~37%), potassium peroxydisulfate ($\text{K}_2\text{S}_2\text{O}_8$, Beijing Chemical Works, $\geq 99\%$), phosphorus pentoxide (P_2O_5 , Beijing Chemical Works, $\geq 99.99\%$), graphite powder (Qingdao Huatai Lubricant Sealing S&T Co. Ltd, Qingdao, China, 99.99%) and nylon filter membranes (Aldrich, pore size 0.2 μm). All chemicals were used as obtained. We use ordinary distilled water as the reaction solvent.

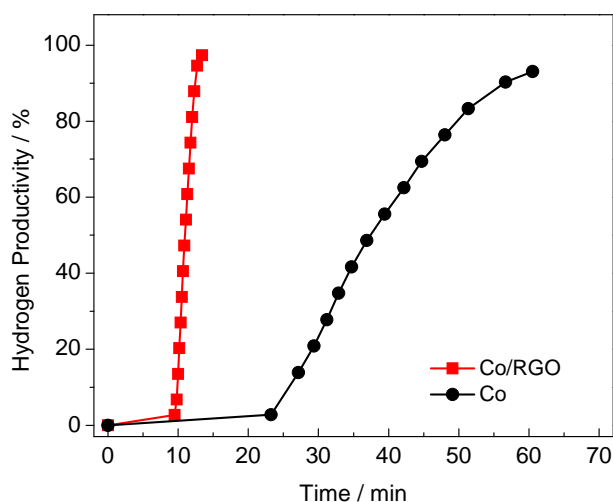


Fig.S1 Hydrogen generation from ammonia borane ($0.10 \text{ mol} \cdot \text{L}^{-1}$, 10 mL) during the synthesis process of Co/RGO and Co nanocatalysts

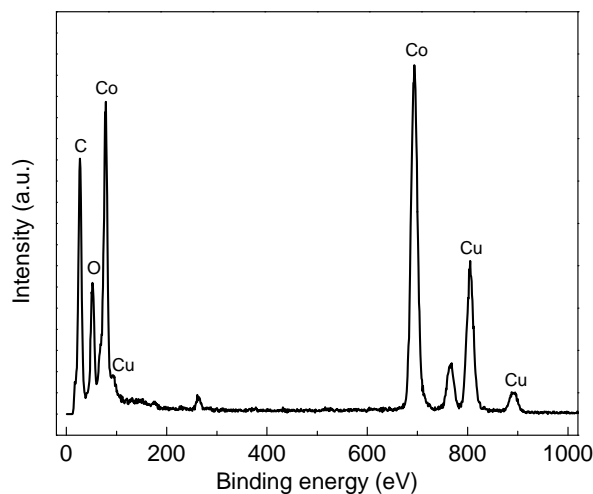


Fig.S2 EDS spectrum of Co/RGO nanocatalysts

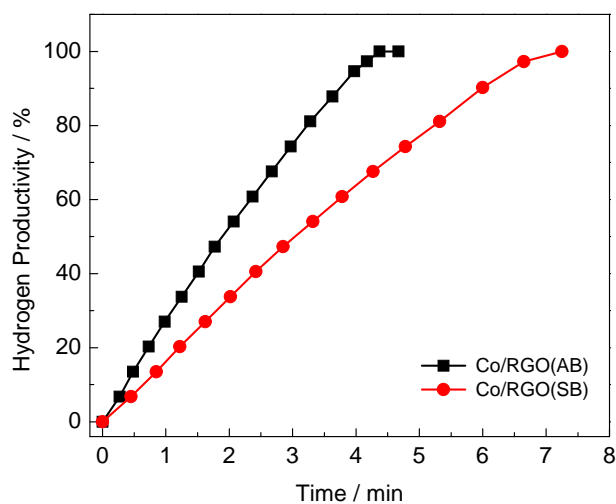


Fig.S3 Hydrogen generation from hydrolysis of ammonia borane ($0.10 \text{ mol}\cdot\text{L}^{-1}$, 10 mL) catalyzed by Co/RGO reduced by AB and NaBH_4 (SB)

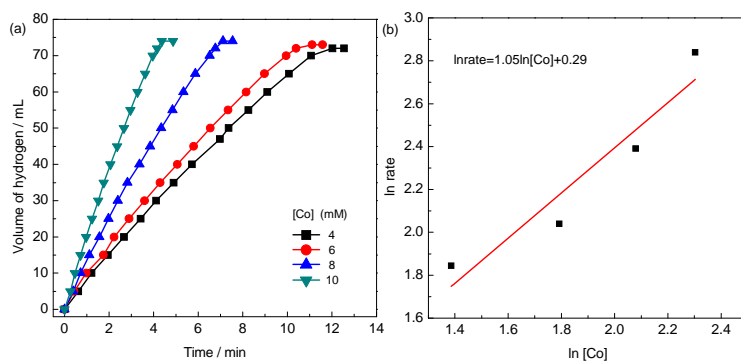


Fig.S4 Plots of volume of hydrogen generated vs time

(a) The hydrolysis of AB ($0.10 \text{ mol}\cdot\text{L}^{-1}$, 10 mL) was catalyzed by Co/RGO at different catalyst concentrations. (b) $\ln \text{rate}$ vs $\ln[\text{Co}]$ plot.