

Supporting information

Enhanced selectivity of CO₂ reverse water-gas reaction over Ni₂P/CeO₂ catalyst

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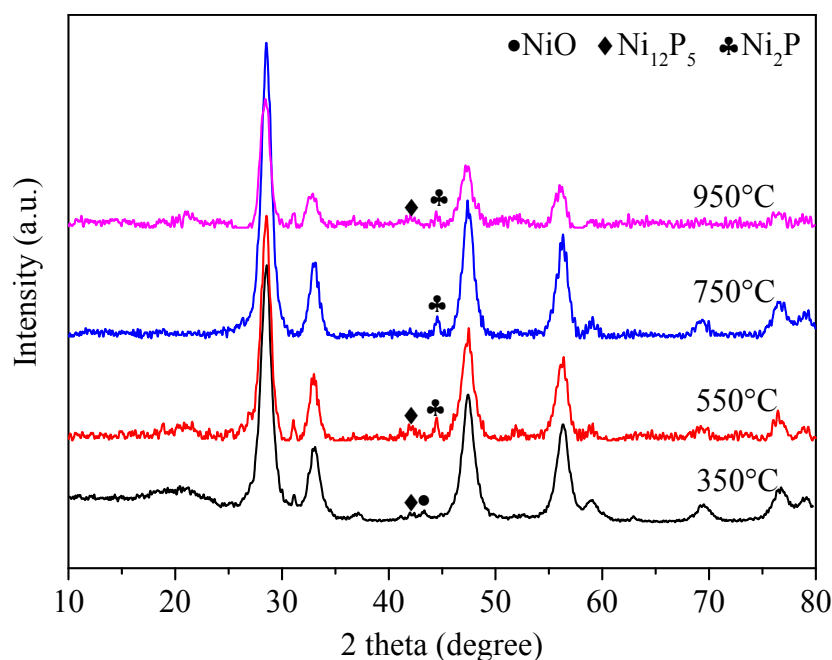


Figure S1. XRD patterns for Ni phosphides supported on CeO₂ observed at different reduction temperature.

Fig. S1 showed the XRD diffraction peaks of Ni_xP_y/CeO₂ which was formed at different reduction temperature. As seen, all samples gave the characteristic peaks of CeO₂ centered at 28.6, 33.1, 47.5, 56.4, 59.4, 69.6, 76.7 and 79.2° (JCPDS No. 43-1002). The sample at 350 °C gave the weak peaks at 41.7 and 43.4°, which were attributed to the Ni₁₂P₅ (JCPDS No. 22-1190) and NiO (JCPDS No: 44-1159), respectively. The sample at 550° showed the XRD peaks at 41.7 and 44.5°, which were due to the Ni₁₂P₅ and Ni₂P (JCPDS No. 03-0953), respectively. As the reduction temperature increased to 750°, except for the characteristic peaks of CeO₂, the only diffraction peak at 44.5° could be observed, linking to the pure Ni₂P phase formed. However, when the reduction temperature was 950°, the Ni₁₂P₅ phase emerged again. This indicated that too low reduction temperature led to incomplete reaction, which was not conducive to the generation of Ni₂P phase. As the temperature gradually increased, the Ni₁₂P₅ was also formed, and this was probably because excessive reaction temperature would accelerate the loss of surface P element, which was adverse to Ni₂P formation. Therefore, the reduction temperature was set to be 750 °C which yield pure Ni₂P phase, would be considered as the optimum for the formation of Ni₂P phase.