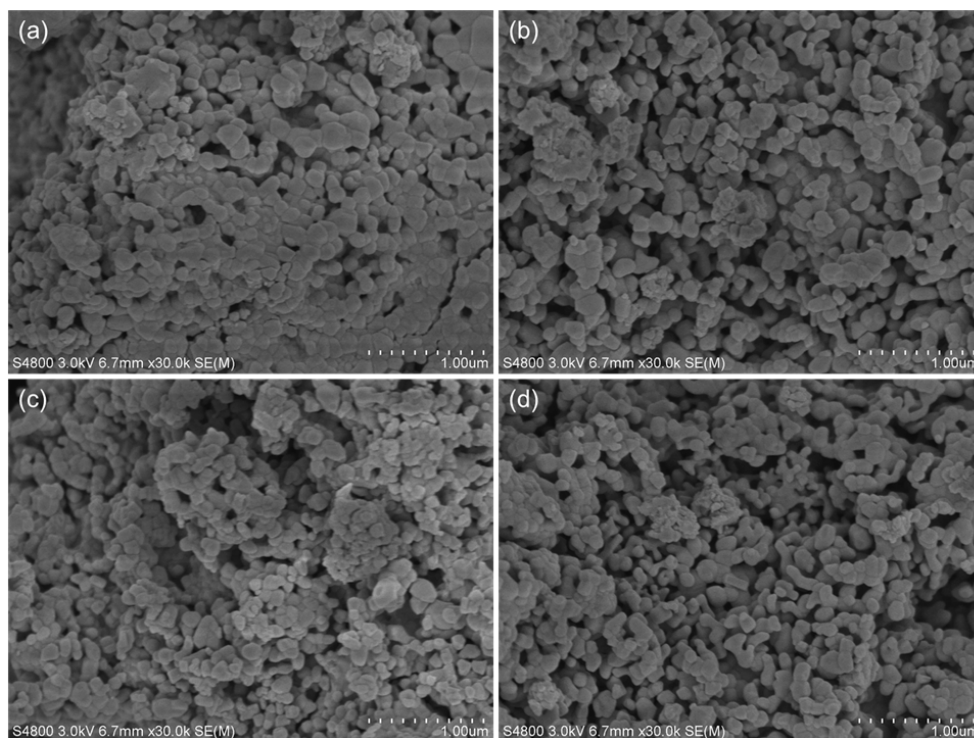
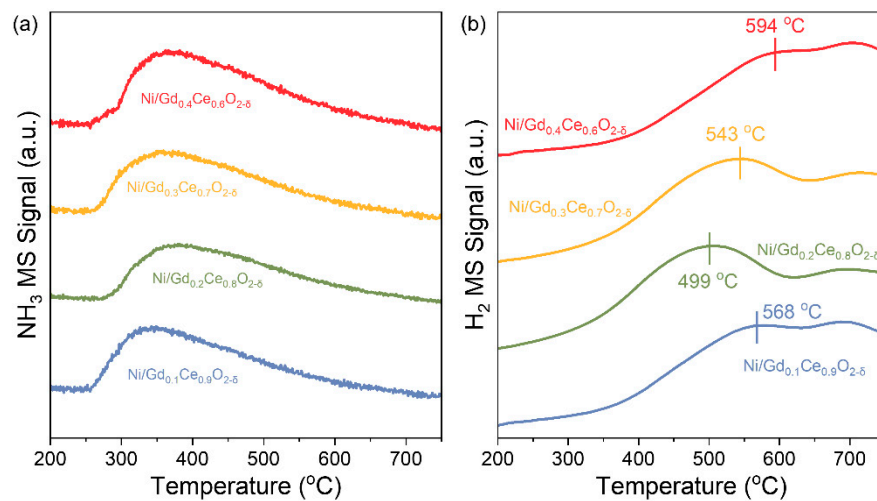


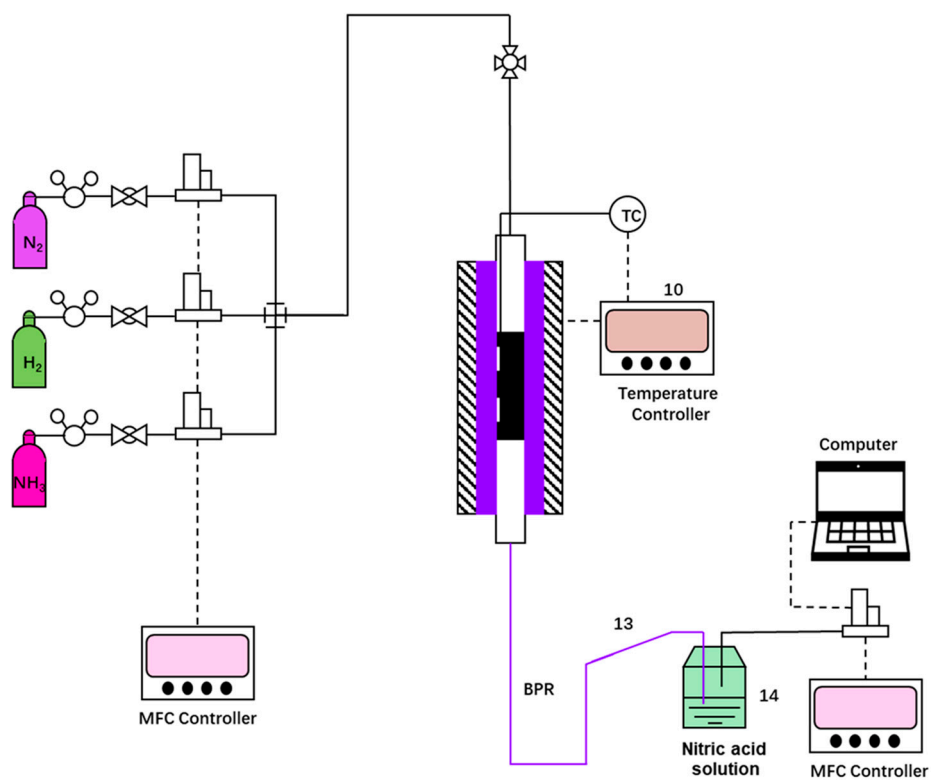
## Supplementary materials



**Figure S1.** SEM images of the as-prepared  $\text{NiO/Ce}_x\text{Gd}_{1-x}\text{O}_{2-\delta}$  catalysts. (a)  $\text{Ni/Gd}_{0.1}\text{Ce}_{0.9}\text{O}_{2-\delta}$ , (b)  $\text{Ni/Gd}_{0.2}\text{Ce}_{0.8}\text{O}_{2-\delta}$ , (c)  $\text{Ni/Gd}_{0.3}\text{Ce}_{0.7}\text{O}_{2-\delta}$ , and (d)  $\text{Ni/Gd}_{0.4}\text{Ce}_{0.6}\text{O}_{2-\delta}$ .



**Figure S2.** (a)  $\text{NH}_3$  and (b)  $\text{H}_2$  profiles derived from  $\text{NH}_3$ -TPSR measurement over  $\text{Ni/Gd}_x\text{Ce}_{1-x}\text{O}_{2-\delta}$  catalysts.



**Figure S3.** Schematic illustration of the ammonia decomposition setup.