

Silicon-nickel intermetallic compounds supported on silica as a highly efficient catalyst for CO methanation

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Supplementary Information

Figure S1 shows the XRD patterns indicating that the $\text{Ni}_3\text{Si}_2\text{O}_5(\text{OH})_4$ phase is very stable on the thermal calcinations in air at 400 °C and the reduction in hydrogen at 350 °C. Only a part of $\text{Ni}_3\text{Si}_2\text{O}_5(\text{OH})_4$ was reduced to metallic Ni phase. However, the peaks due to $\text{Ni}_3\text{Si}_2\text{O}_5(\text{OH})_4$ at 35° and 62° vanished with the increasing silicification temperature. Therefore, it can be concluded that the stable $\text{Ni}_3\text{Si}_2\text{O}_5(\text{OH})_4$ phase can be reacted with SiH_4 as the follow reaction: $\text{Ni}_3\text{Si}_2\text{O}_5(\text{OH})_4 + \text{SiH}_4 \rightarrow \text{NiSi}_x + \text{SiO}_2 + \text{H}_2\text{O}$.

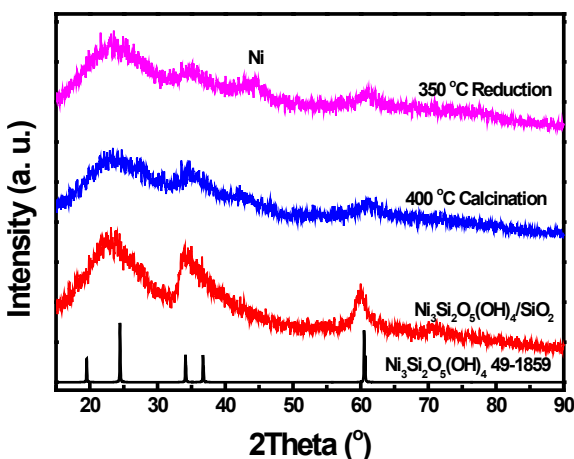


Fig. S1 XRD patterns of $\text{Ni}_3\text{Si}_2\text{O}_5(\text{OH})_4/\text{SiO}_2$ precursor, calcined sample, and reduced sample.