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Article

Ni–Cu High-Loaded Sol–Gel Catalysts for Dehydrogenation of Liquid Organic Hydrides: Insights into Structural Features and Relationship with Catalytic Activity

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Field Emission Scanning Electron Microscopy

Morphology of the nickel precursor used in the sol-gel synthesis was analyzed using a Field emission scanning electron microscope FESEM, HITACHI SU-8230.

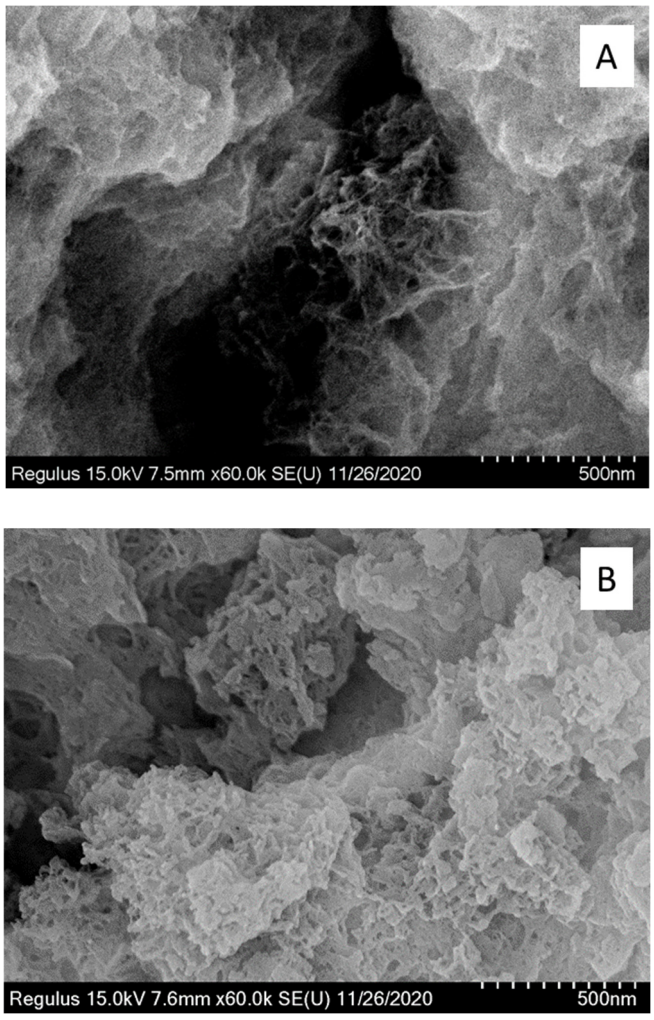
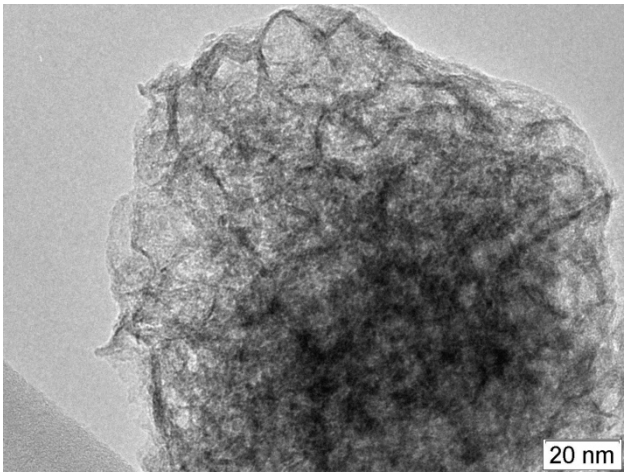


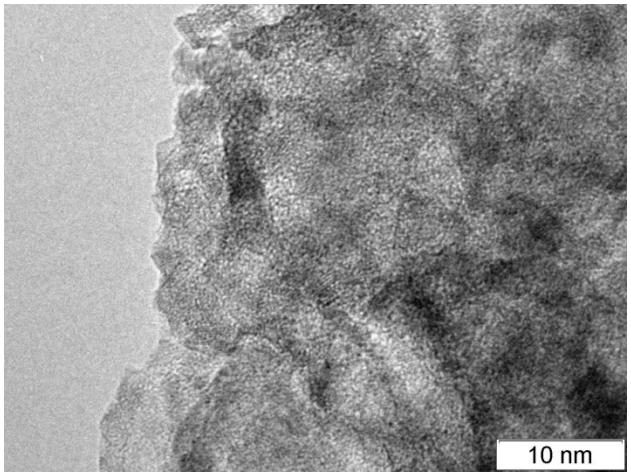
Figure S1. SEM image of nickel(II) carbonate basic hydrate (the nickel precursor used in the sol-gel synthesis) without any treatment (A) and after coating with gold film (B).

High Resolution Transmission Electron Microscopy (HRTEM)

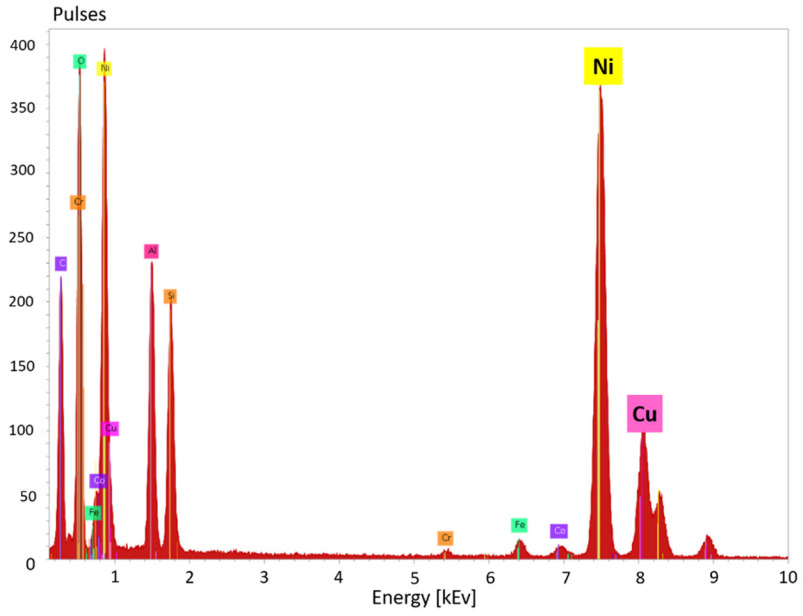
HRTEM images were obtained using a JEM-2010 (JEOL Ltd., Japan, lattice-fringe resolution 0.14 nm) electron microscope operated at an accelerating voltage of 200 kV. The microscope was equipped with an energy-dispersive X-ray (EDX) XFlash spectrometer (Bruker, Germany) with Si-detector and an energy resolution of 130 eV. The samples for the HRTEM study were prepared on a holey carbon film mounted on an aluminum grid by the ultrasonic dispersing of the catalyst suspension in ethanol.



(**a**)

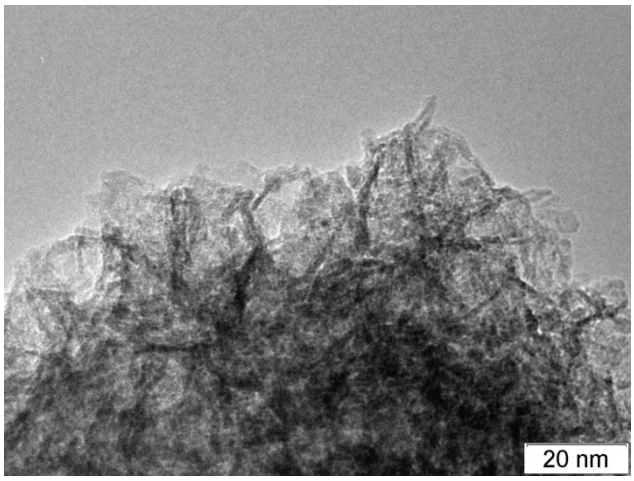


(**b**)

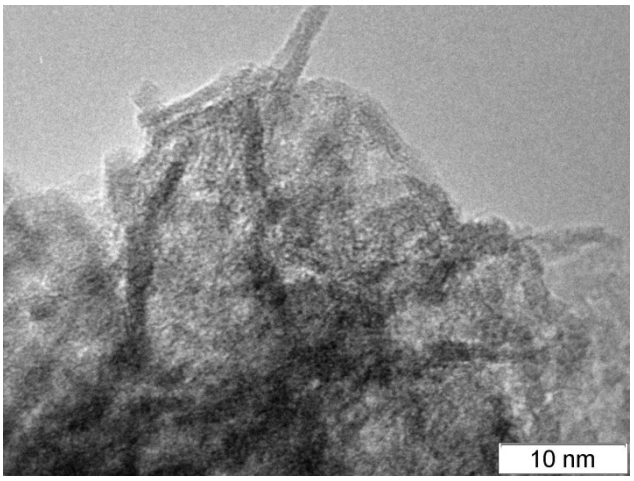


(**c**)

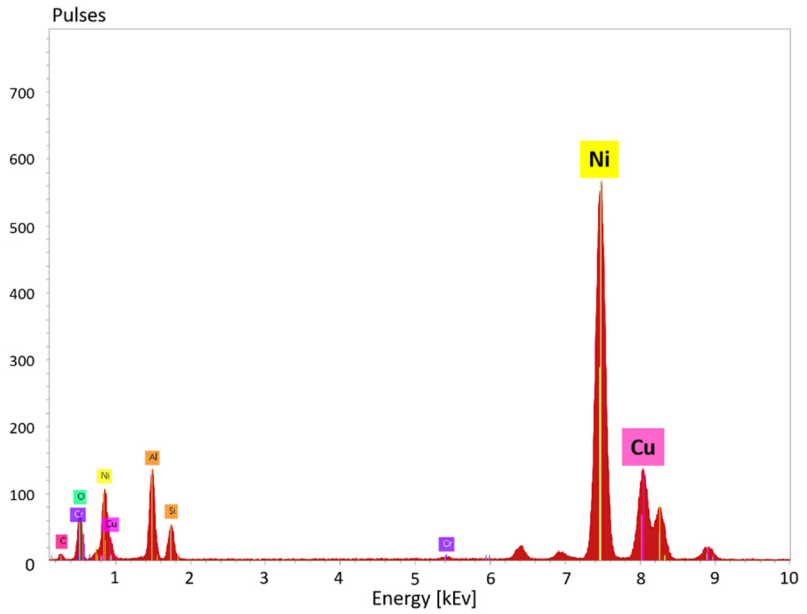
Figure S2. HRTEM images (**a**,**b**) and representative EDX spectrum (**c**) of ex situ reduced Cu20Ni80-SiO_2 catalyst.



(**a**)

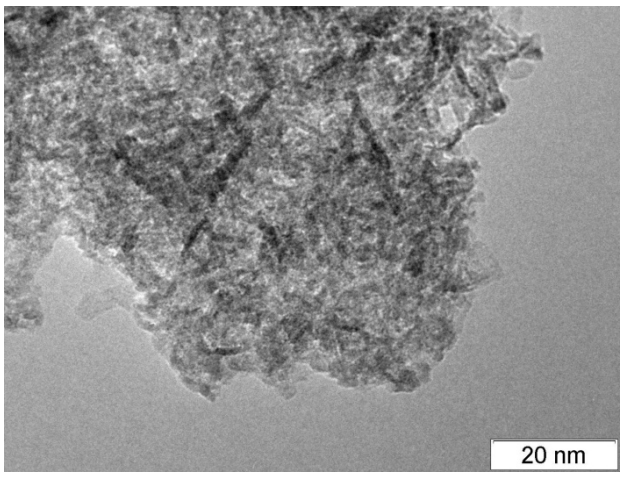


(**b**)

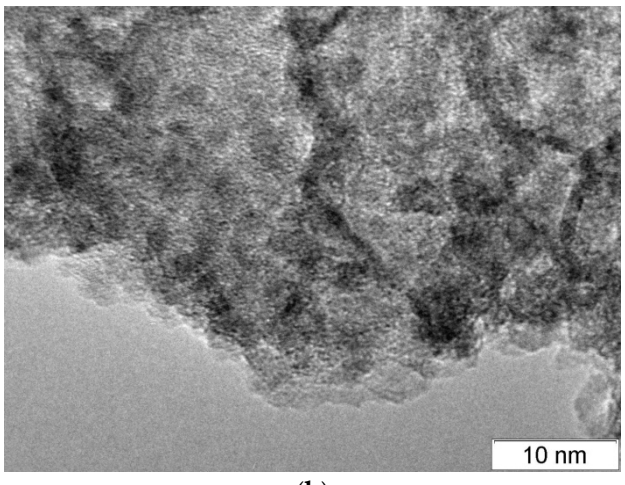


(**c**)

Figure S3. HRTEM images (**a**,**b**) and representative EDX spectrum (**c**) of ex situ reduced Cu20/Ni80-SiO_2 catalyst.



(**a**)



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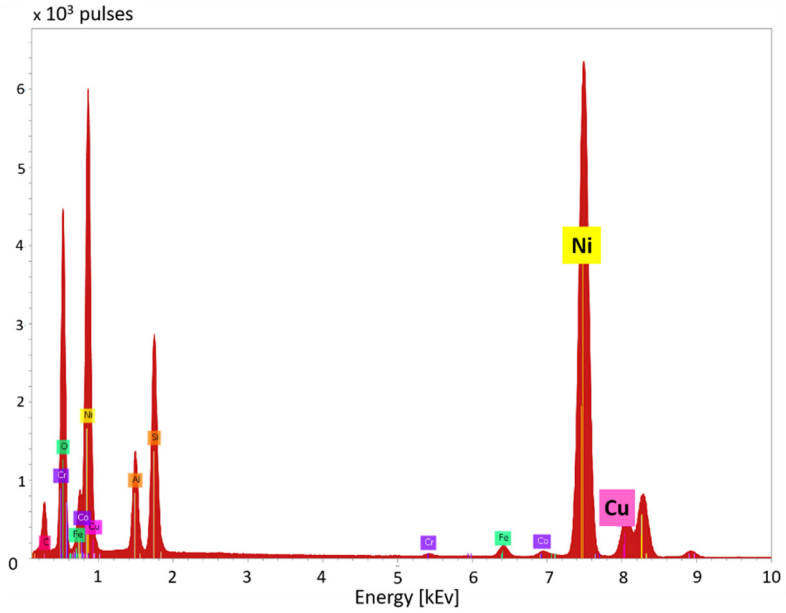
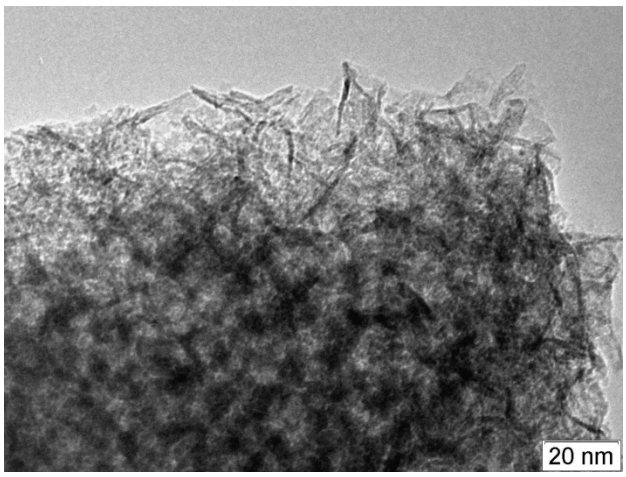
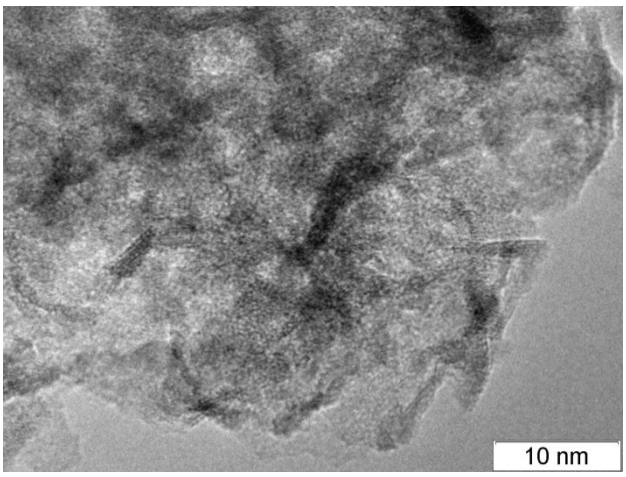


(**c**)

Figure S4. HRTEM images (**a**,**b**) and representative EDX spectrum (**c**) of ex situ reduced Cu5Ni95-SiO_2 catalyst.



(**a**)



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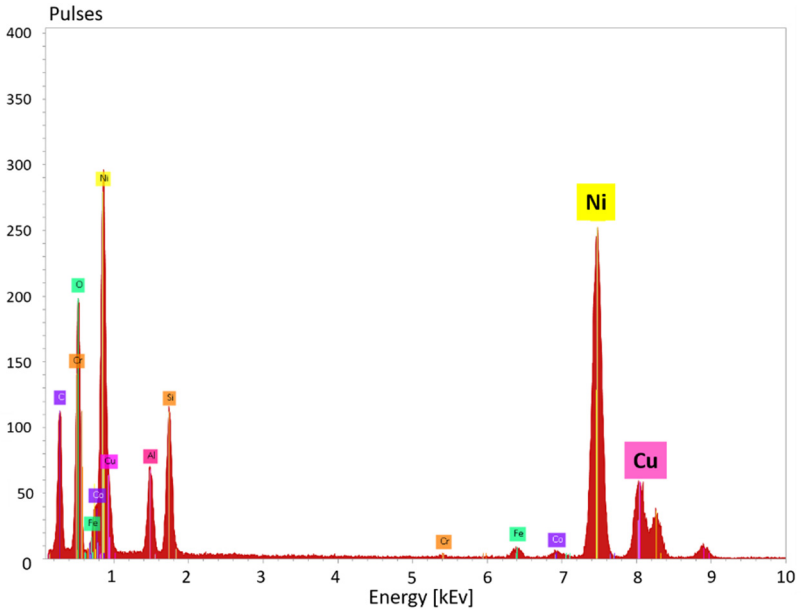

(**c**)

Figure S5. HRTEM images (**a**,**b**) and representative EDX spectrum (**c**) of ex situ reduced Cu5/Ni95-SiO_2 catalyst.

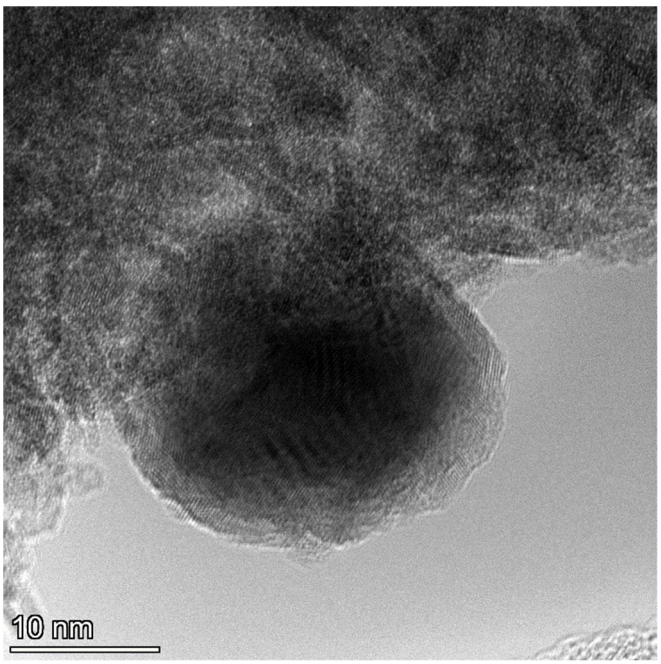

Figure S6. HRTEM image of ex situ reduced Cu20/Ni80-SiO_2 catalyst: metallic Ni-enriched (NiCu) particle with an oxide cover.