Hydrogenation of 3-Hydroxypropanal to 1,3-Propanediol over Cu-V/Ni/SiO_2 Catalyst

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Electronic Supplementary Information

Fig S1 the element distribution of the Cu-V/Ni/SiO_2

Table S1 the maximum temperatures and area percentages of each deconvoluted peak of various catalysts

Table S2 XPS binding energies for various catalysts

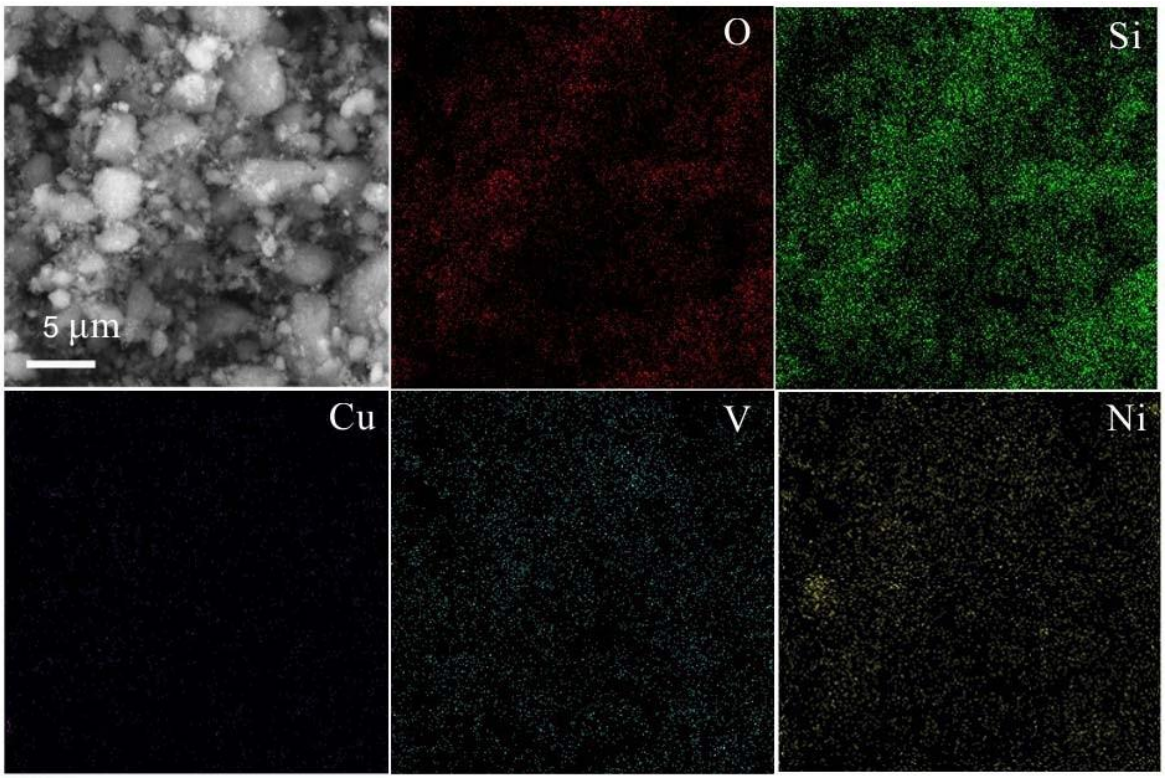

Fig S1 the element distribution of the Cu-V/Ni/SiO_2

Scanning electron microscopy (SEM) and EDS mapping were carried out over a Philips XL30E-SEM-FEG scanning electron microscope, operated at an accelerating voltage of 20 kV. The powder sample was directly measured.

Table S1 the maximum temperatures and area percentages of each deconvoluted peak of various catalysts

Catalyst	Temperature (°C)							
	Cu particles [a]		Ni particles [b]				V particles [c]	
			L-NiO	S-NiO	W-NiO-SiO_2	S-NiO-SiO_2		
15Ni/SiO_2				396.1(65.7%)	461.1(32.0%)	590.2(2.3%)		
30Ni/SiO_2			300.0(2.3%)	381.6(74.6%)	456.7(23.1%)			
5Cu-20V/30Ni/SiO_2	241.8(42.4%)	273.2(57.6%)		365.1(18.2%)	407.7(81.8%)		486.2(32.9%)	520.4(67.1%)

[a] The value in parentheses is the percentage composition of the Cu;

[b] The value in parentheses is the percentage composition of the Ni;

[c] The value in parentheses is the percentage composition of the V.

Table S2 XPS binding energies for various catalysts

Catalyst	binding energy (eV)				
	V $2p_{3/2}$ [a]		Ni $2p_{3/2}$ [b]		Cu 2p
15Ni/SiO_2			**854.0(64.7%)**	**855.8(35.3%)**	
30Ni/SiO_2			**854.0(66.2%)**	**855.8(33.8%)**	
5Cu-20V/30Ni/SiO_2	**516.2(86.5%)**	**517.3(13.5%)**	**854.5(59.2%)**	**856.1(40.8%)**	**933.8**

[a] The value in parentheses is the percentage composition of the V $2p_{3/2}$;

[b] The value in parentheses is the percentage composition of the Ni $2p_{3/2}$.