Supporting Information

Shape-Selective Synthesis of NiO Nanostructures for Hydrazine Oxidation as a Nonenzymatic Amperometric Sensor

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Table S1. Size and Shape of the NiO nanostrucutres by TEM and XRD

Type of reducing agents	Crystallite size by XRD nm	Size and Shape by TEM	
		Shape	Size (width) nm
NaOH with PEG	4.66	Nano-pellet	~3-4
NaOH	3.08	Nano-rods	~2-3
NH_3	2.71	Nano-dots	~2-3
Na_2CO_3	12.51	Cuboid	~10-20

Table S2. Characteristics of $NiO@SiO_2$ samples determined by N_2 sorption

Type of reducing agents	Shape of NiO	S_{BET} (m^2/g)	Pore volume (cm^3/g)
NaOH with PEG	Nano-pellet	19.3	0.1098
NaOH	Nano-rods	22.5	0.1375
NH_3	Nano-dots	32.7	0.1786
Na_2CO_3	Cuboid	47.3	0.2569

Table S3. Electrocatalytic activity of NiO and NiO-silica core shell nanostructures

Type of reducing agents	**Shape of NiO**	**Electrocatalytic activity towards hydrazine oxidation $mA \cdot g^{-1}$**	
		NiO	**NiO@SiO_2**
NaOH with PEG	Nano-pellet	953	231
NaOH	Nano-rods	396	298
NH_3	Nano-dots	310	155
Na_2CO_3	Cuboid	503	325

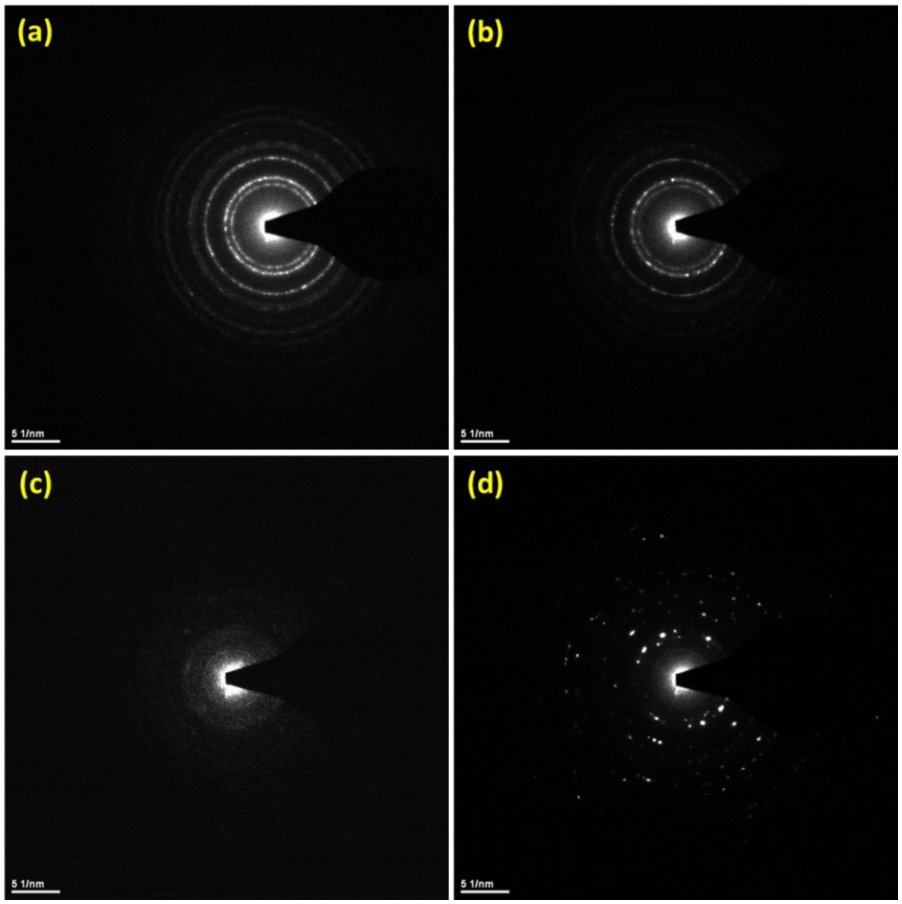

Figure S1. SAED patterns of NiO nanostructures prepared using different reducing agents such as (a) NaOH with PEG, (b) NaOH without PEG, (c) NH_3 and (d) Na_2CO_3.

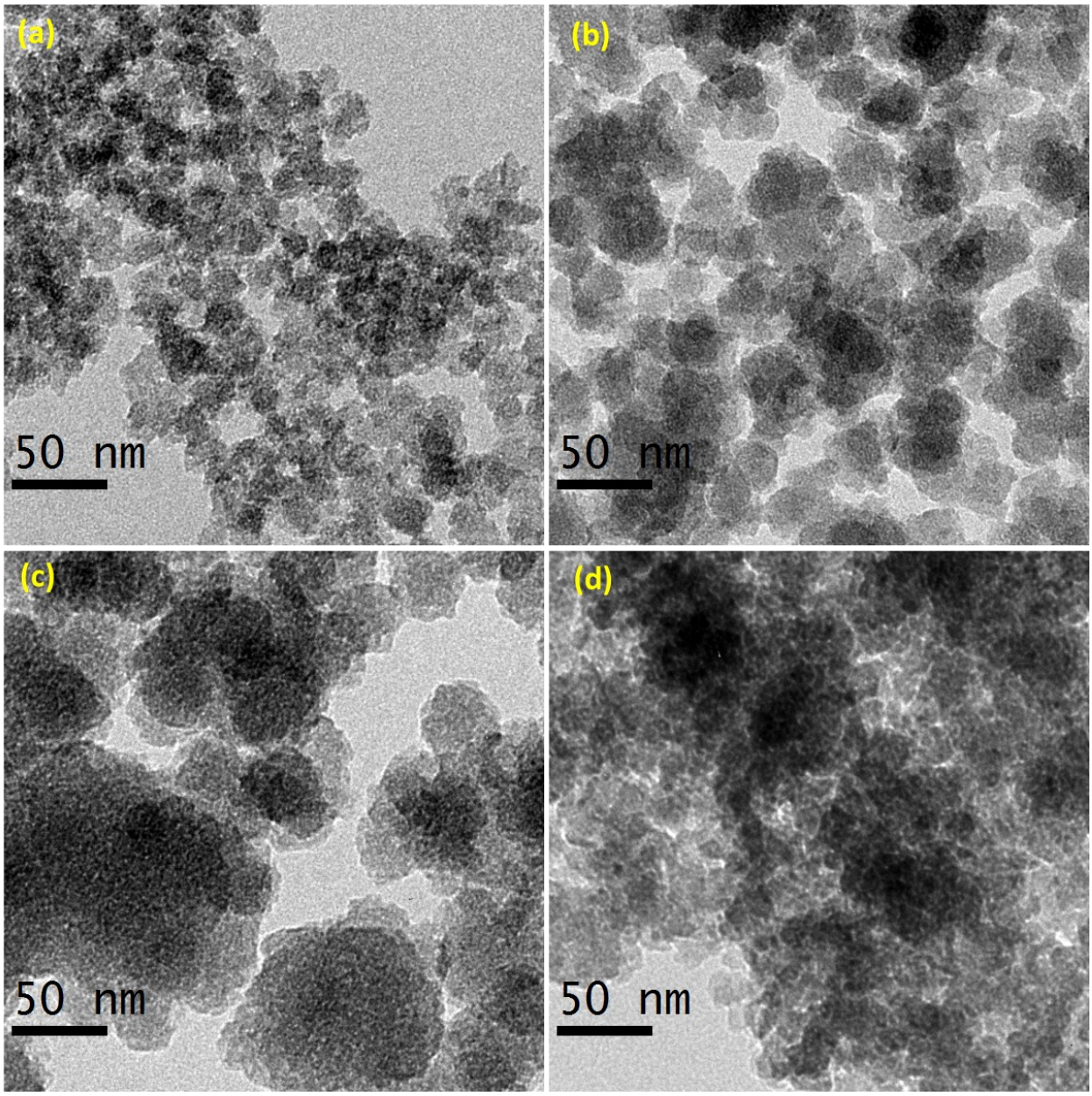

Fig. S2. TEM images of $NiO@SiO_2$ nanostructures prepared for different reducing agents using NiO (a) NaOH with PEG, (b) NaOH without PEG, (c) NH_3 and (d) Na_2CO_3.

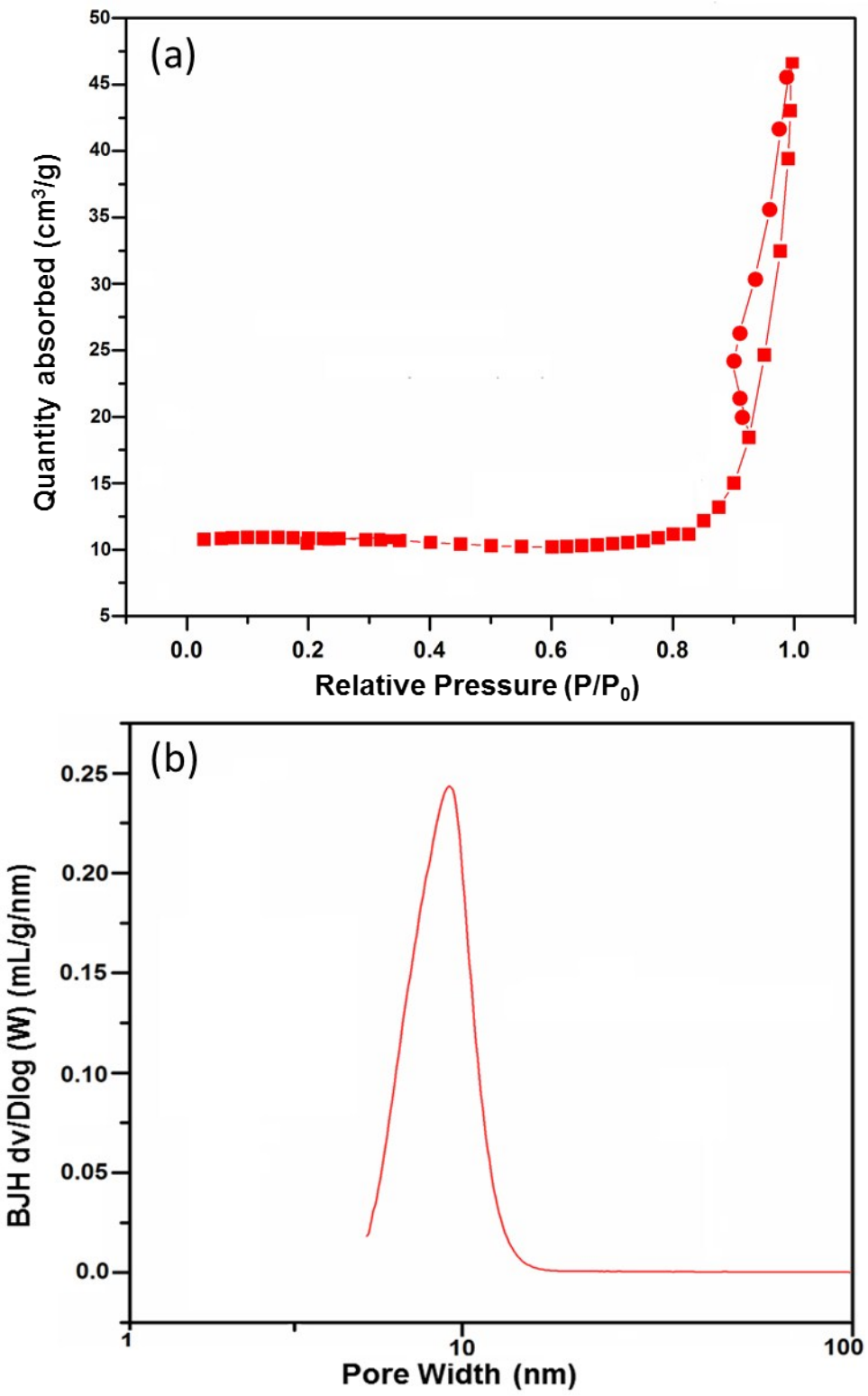

Fig. S3. Adsorption and desorption isotherm of N_2 and pore size distribution of cuboid shape $NiO@SiO_2$ structure.

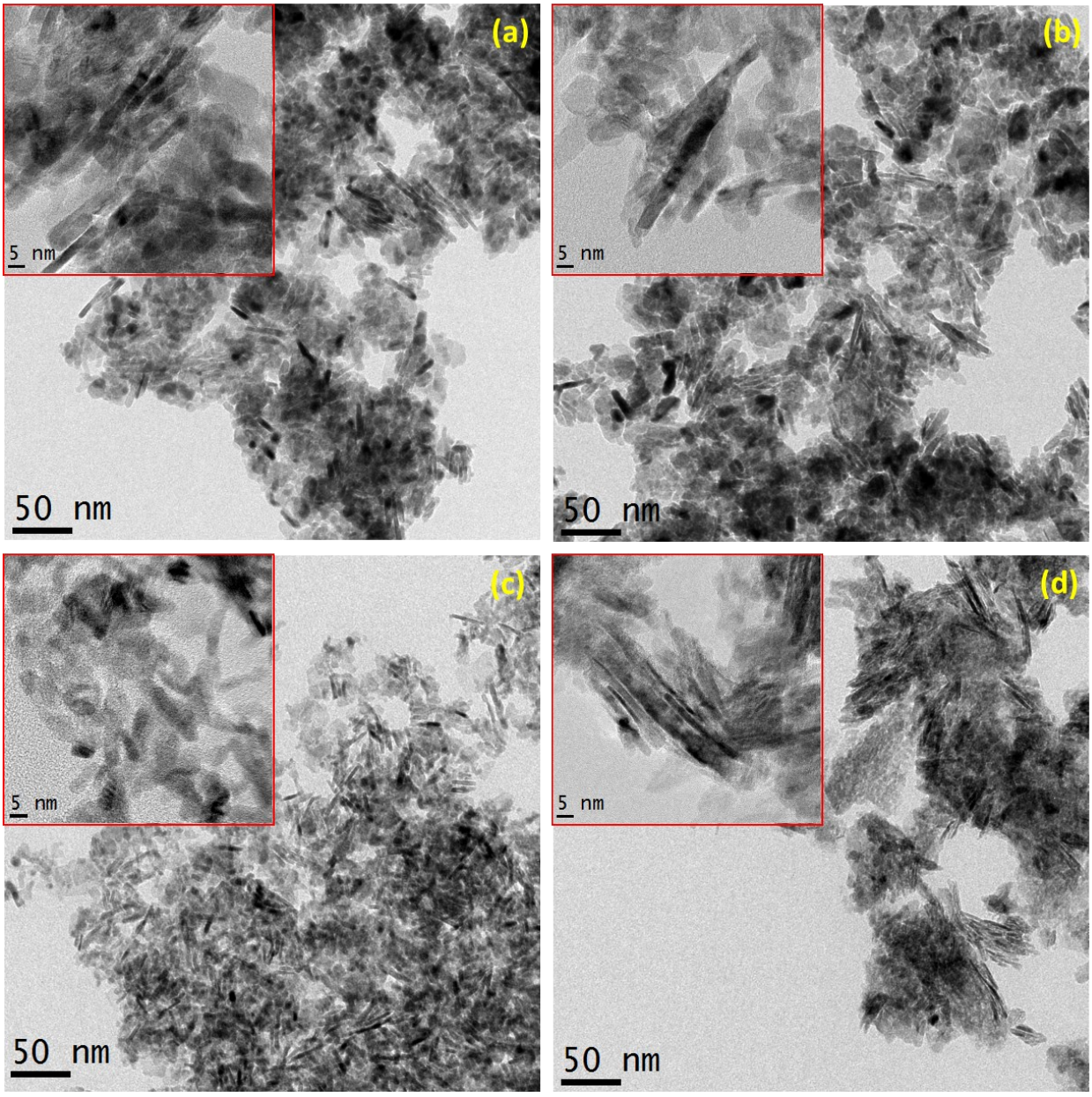

Fig. S4. TEM images of NiO nanostructures prepared at different solution bath temperatures with using NaOH with PEG as a reducing agent (a) 40 ^{o}C, (b) 55 ^{o}C, (c) 70 ^{o}C and (c) 85 ^{o}C. (c) is the same image as Figure 2a.

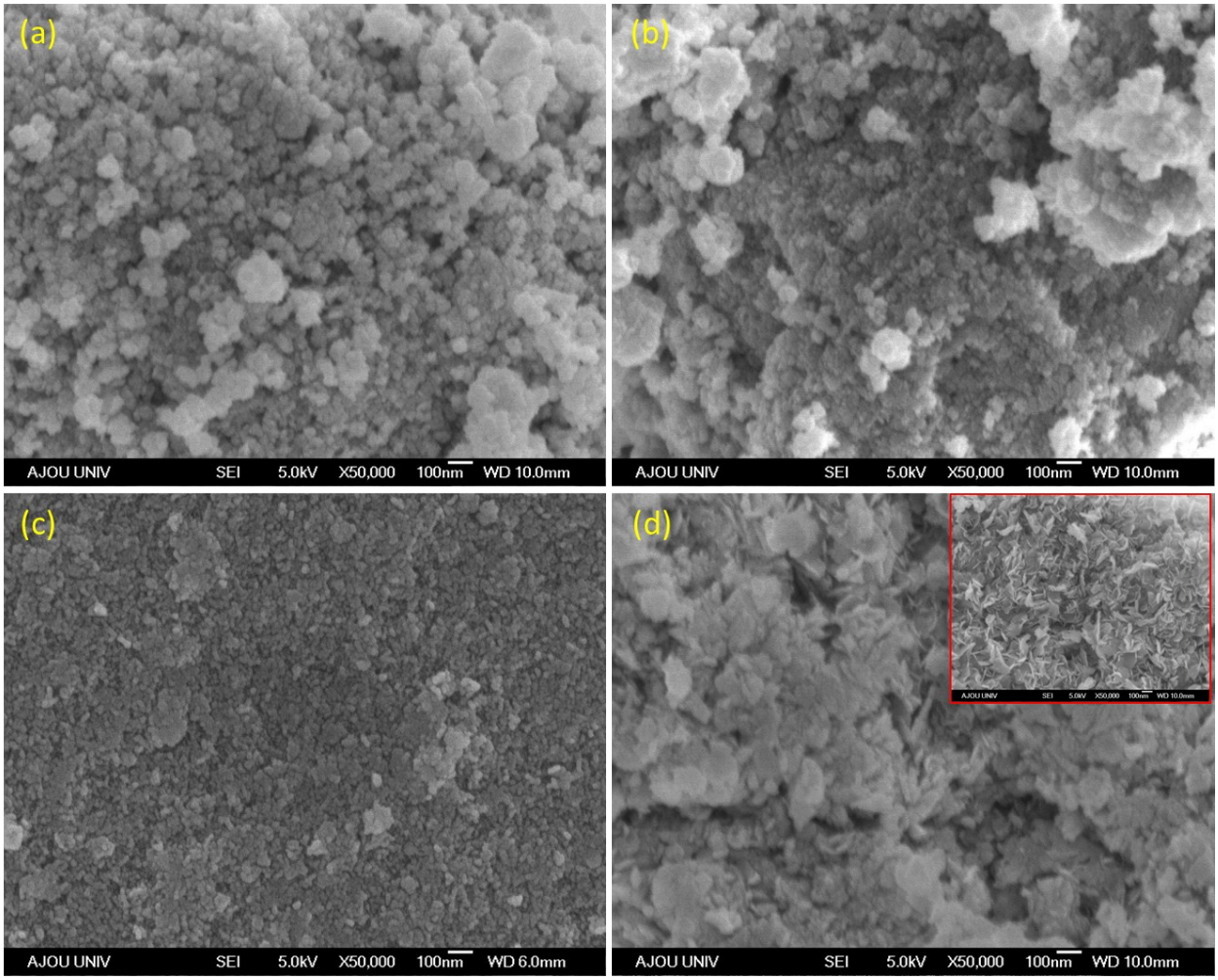

Fig. S5. SEM micrographs of NiO nanostructures prepared at different solution bath temperatures with using NaOH with PEG as a reducing agent (a) 40 ^{o}C, (b) 55 ^{o}C, (c) 70 ^{o}C and (d) 85 ^{o}C. (c) is the same image as Figure 1a.

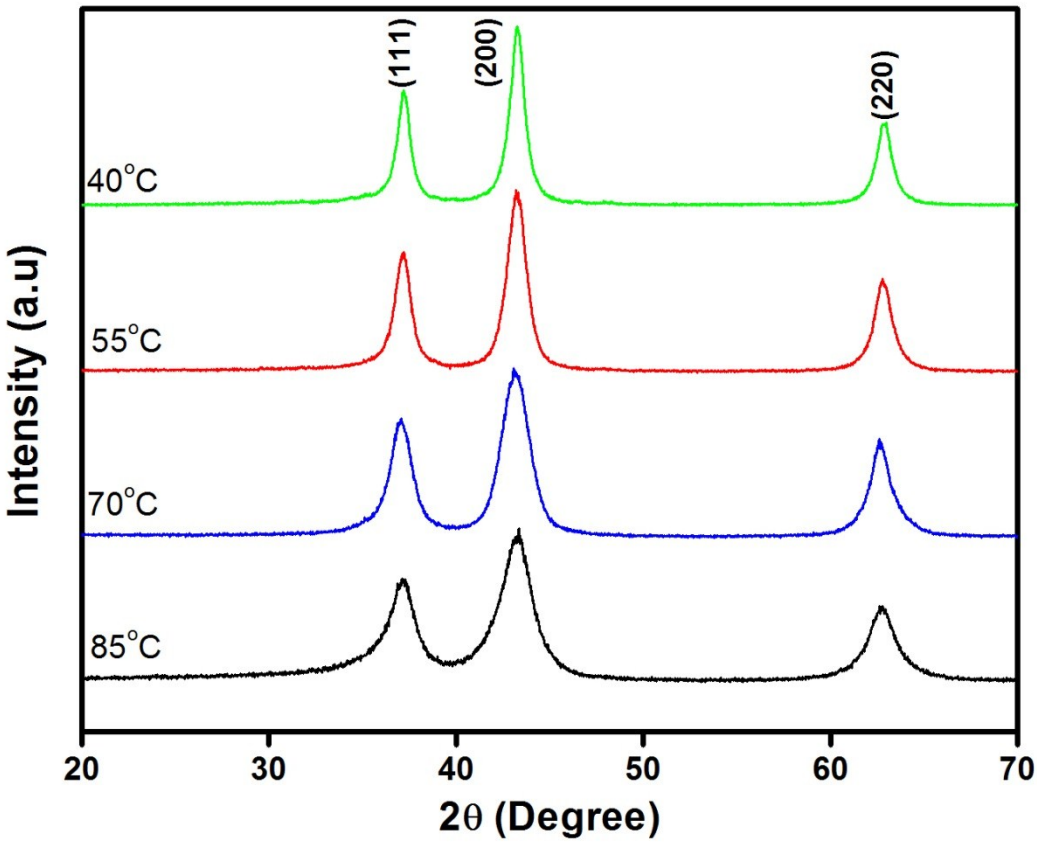

Fig. S6. X-ray diffraction patterns of NiO nanostructures reduced using NaOH with PEG at different solution bath temperatures.

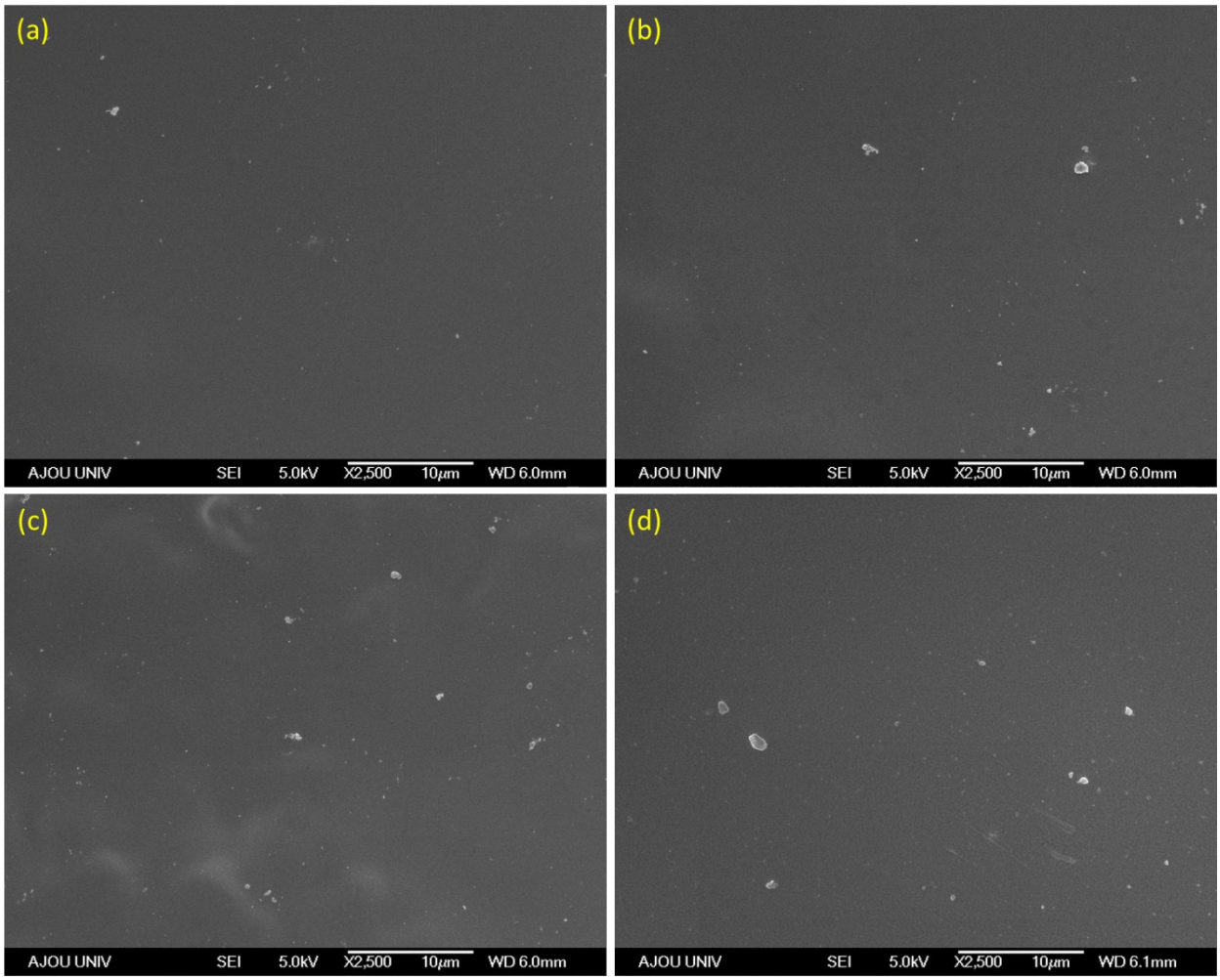

Fig. S7. SEM micrographs of Nafion/NiO/GC electrode surface. NiO prepared using different reducing agents (a) NaOH with PEG, (b) NaOH without PEG, (c) NH_3 and (d) Na_2CO_3.

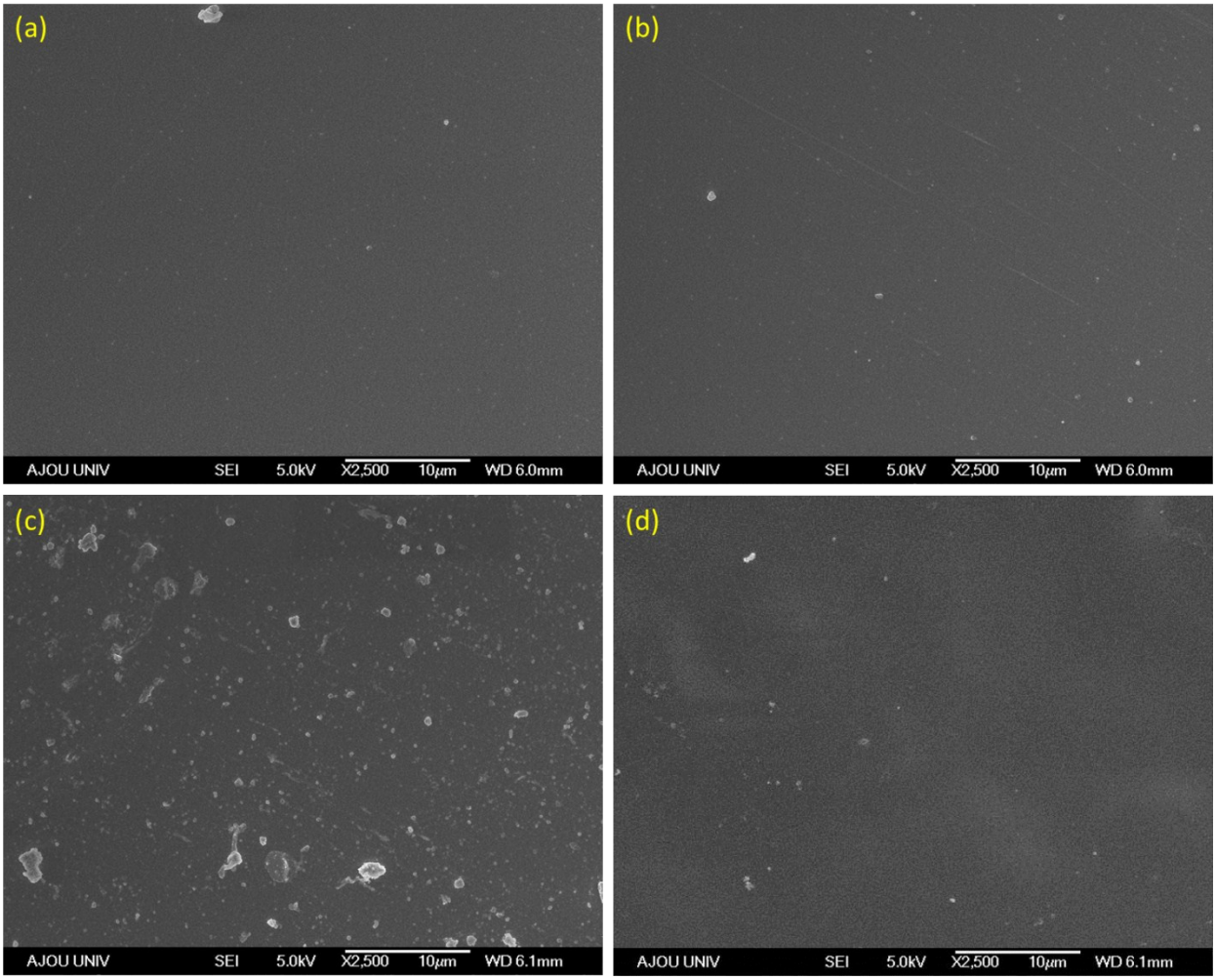

Fig. S8. SEM micrographs of Nafion/NiO@SiO_2/GC electrode surface. NiO prepared using different reducing agents (a) NaOH with PEG, (b) NaOH without PEG, (c) NH_3 and (d) Na_2CO_3.

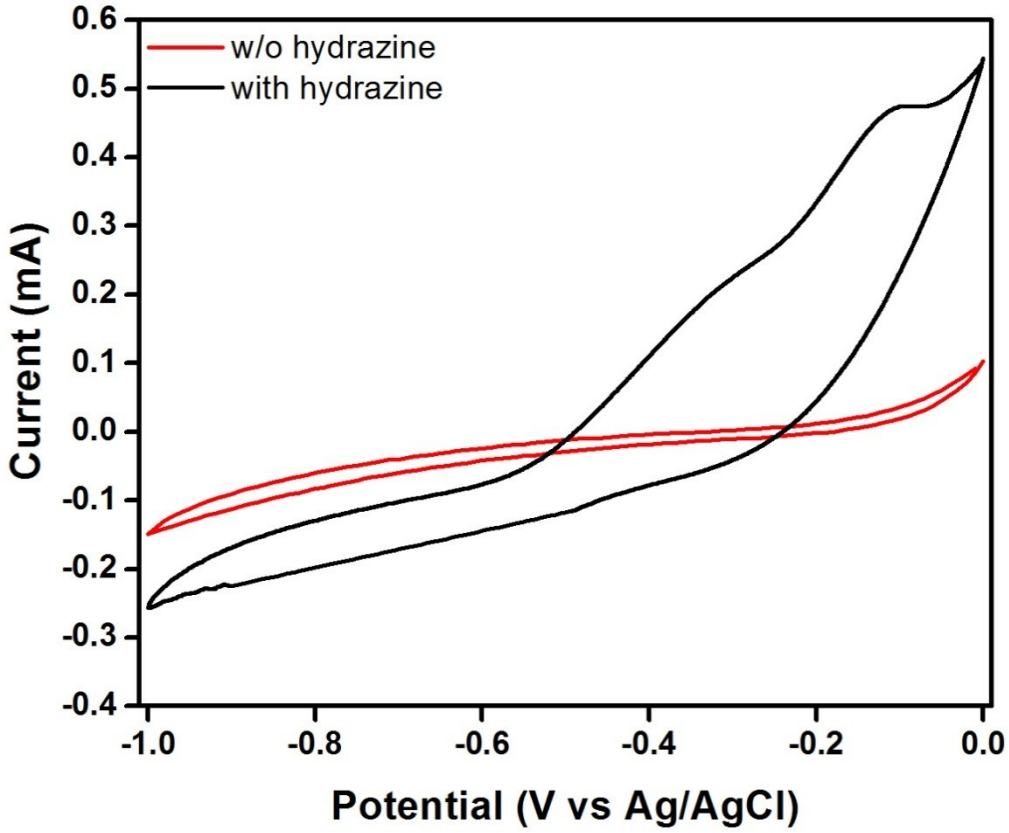

Fig. S9. Cyclic voltammograms of the Nafion/NiO/GC electrode in 0.025 M NaOH with and without hydrazine hydrate (0.1 M) at 100 $mV \cdot s^{-1}$ scan rates.