Electronic supplementary information (ESI)

Utilisation of *in situ* formed cyano-bridged coordination polymers as precursors of supported Ir–Ni alloy nanoparticles with precisely controlled compositions and sizes

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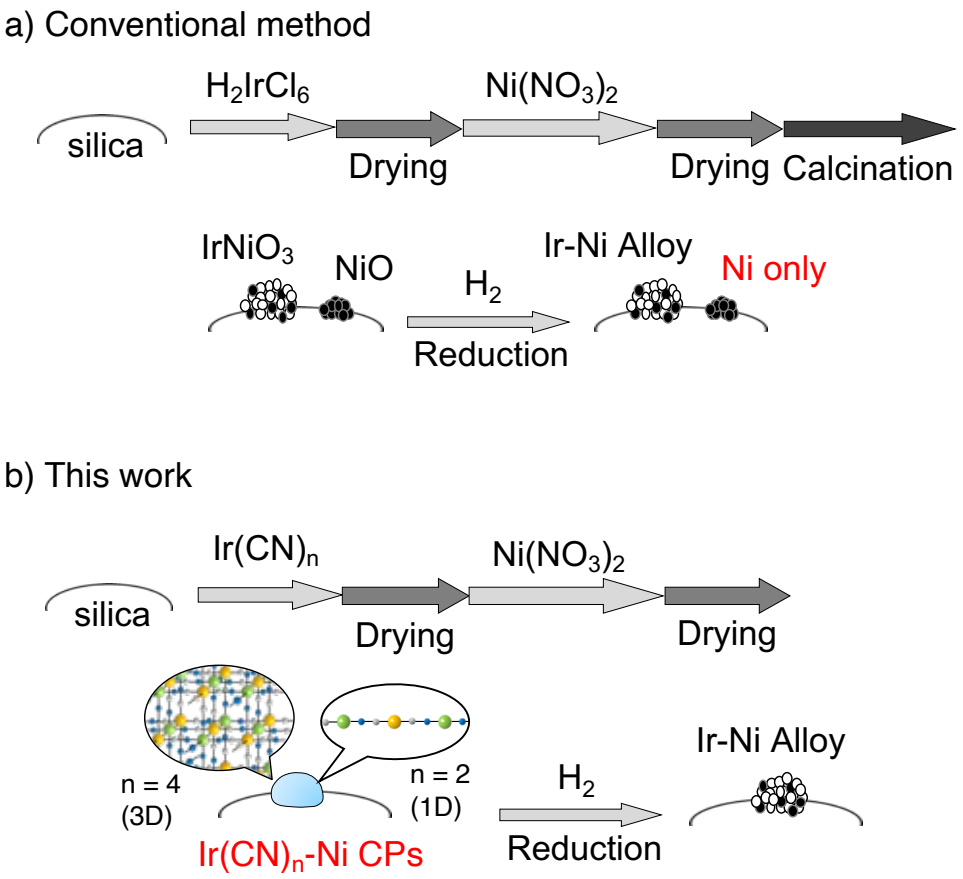

Scheme S1. Preparation methods of Ir-Ni alloys supported on SiO_2 by using $Ni(NO_3)_2$ and (a) H_2IrCl_6 and (b) $[Ir(CN)_6]^{3-}$ (**Ir(CN)$_6$**) or $[Ir(ppy)_2(CN)_2]^-$ (ppy = 2-phenypyridine; **Ir(CN)$_2$**) as precursors. Formation of unalloyed Ni nanoparticles (Ni only) is hardly avoidable with H_2IrCl_6.

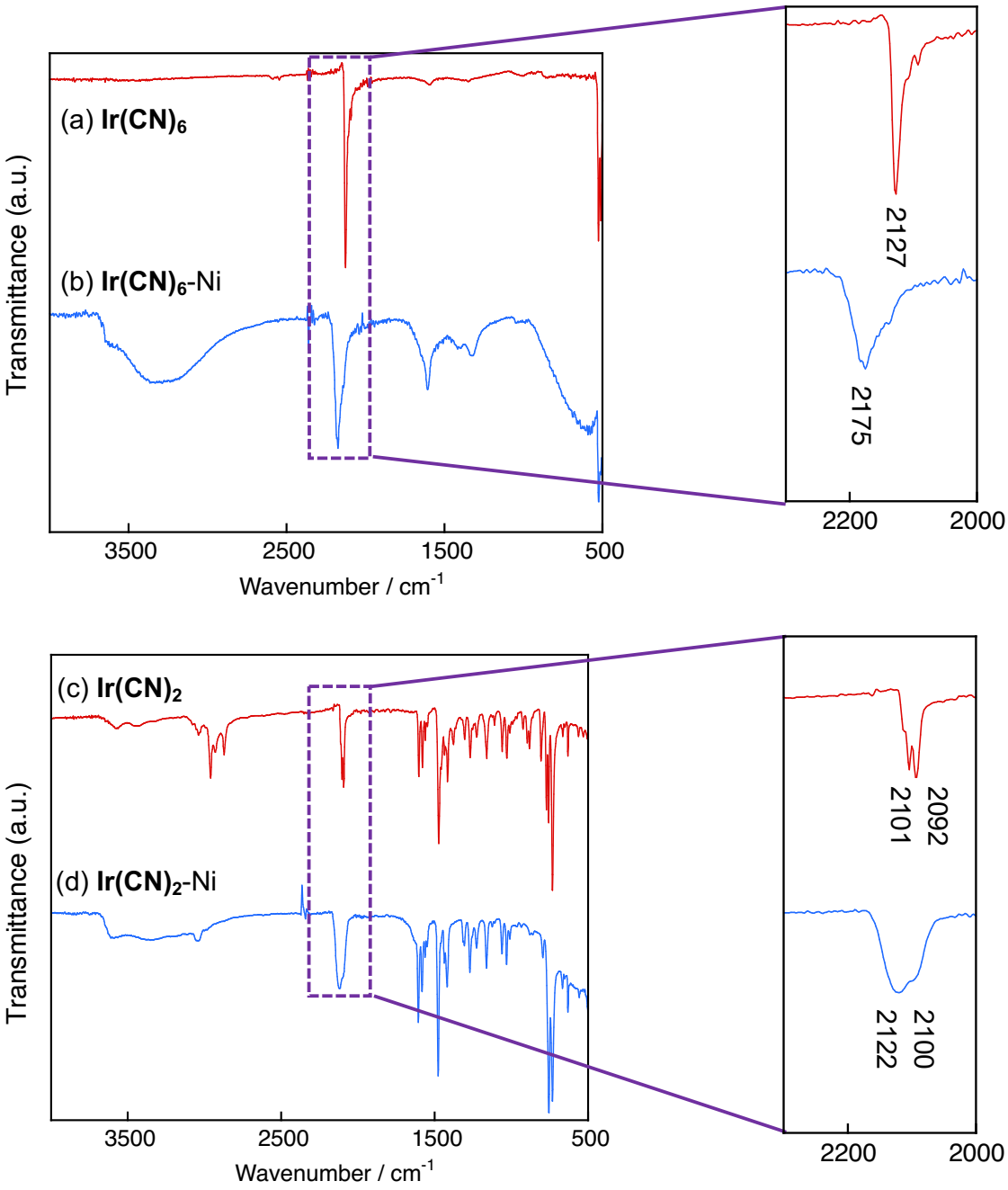

Fig. S1. IR spectra of (a) $K_3[Ir(CN)_6]$ (**Ir(CN)$_6$**), (b) $Ni_{1.5}[Ir(CN)_6]$ (**Ir(CN)$_6$**-Ni), (c) (*n*-$Bu_4N)[Ir(ppy)_2(CN)_2]$ (**Ir(CN)$_2$**) and (d) $Ni_{0.5}[Ir(ppy)_2(CN)_2]$ (**Ir(CN)$_2$**-Ni).

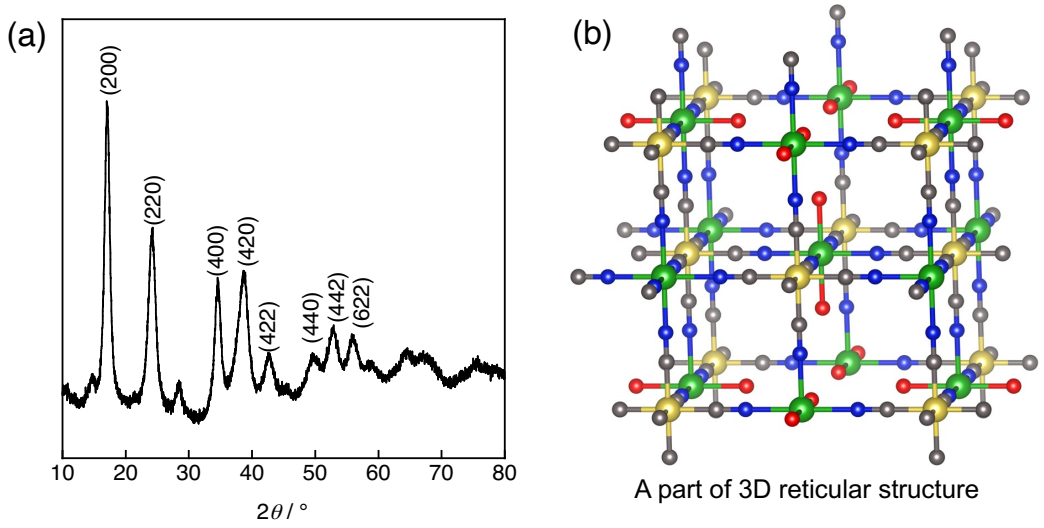

Fig. S2. (a) Powder X-ray diffraction pattern of $Ni_{1.5}[Ir(CN)_6]$ (**Ir(CN)$_6$**-Ni) and (b) a schematic drawing of the 3D reticular structure usually observed for Prussian blue analogues. The numbers in parenthesis are (*hkl)* indices.

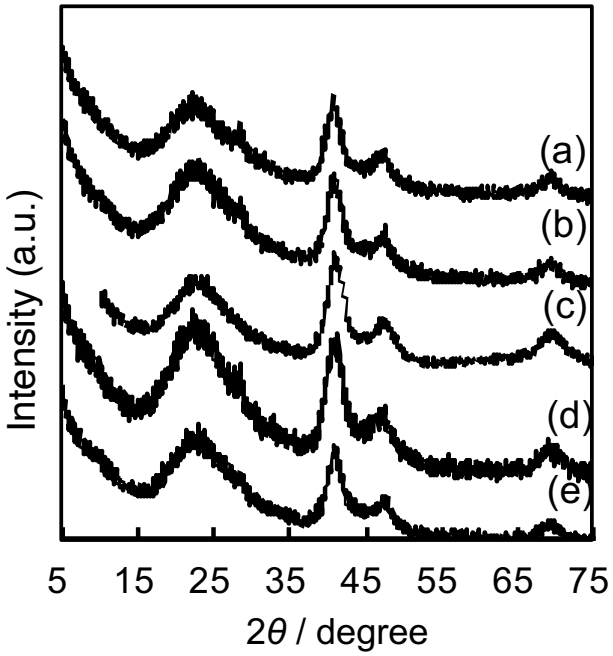

Fig. S3. Powder X-ray diffraction patterns of **Ir(CN)$_6$**-Ni/SiO_2-X [X = Ni/(Ni+Ir)]. X = (a) 0.05, (b) 0.10, (c) 0.15 (d) 0.20 and (e) 0.25 in wide range.

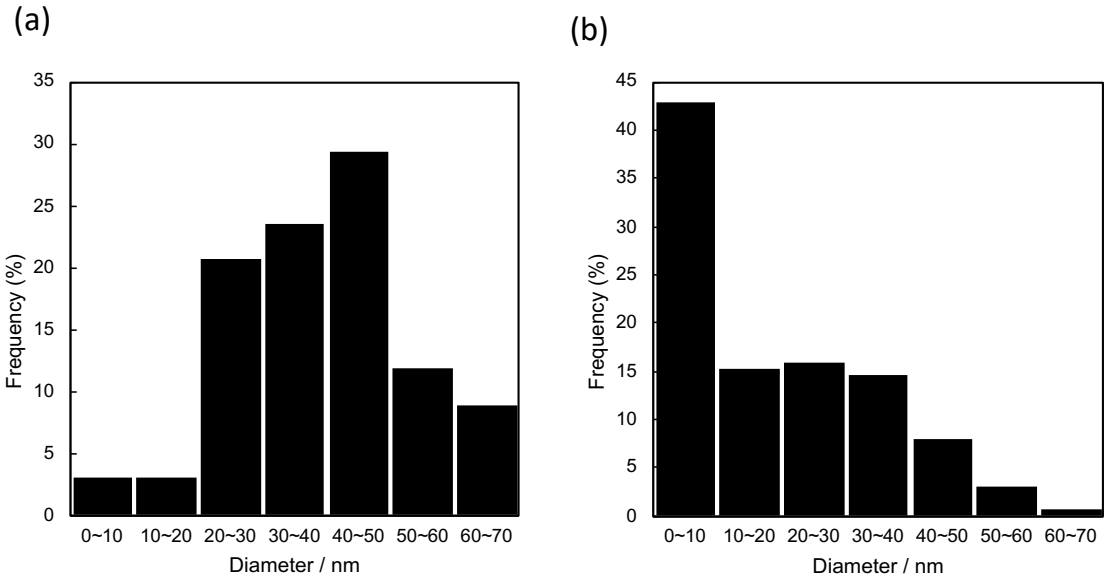

Fig. S4. Size distributions of supported particles in (a) **Ir(CN)$_6$**-Ni/SiO$_2$-0.2 and (b) **Ir(CN)$_6$**-Ni/SiO$_2$-0.4.

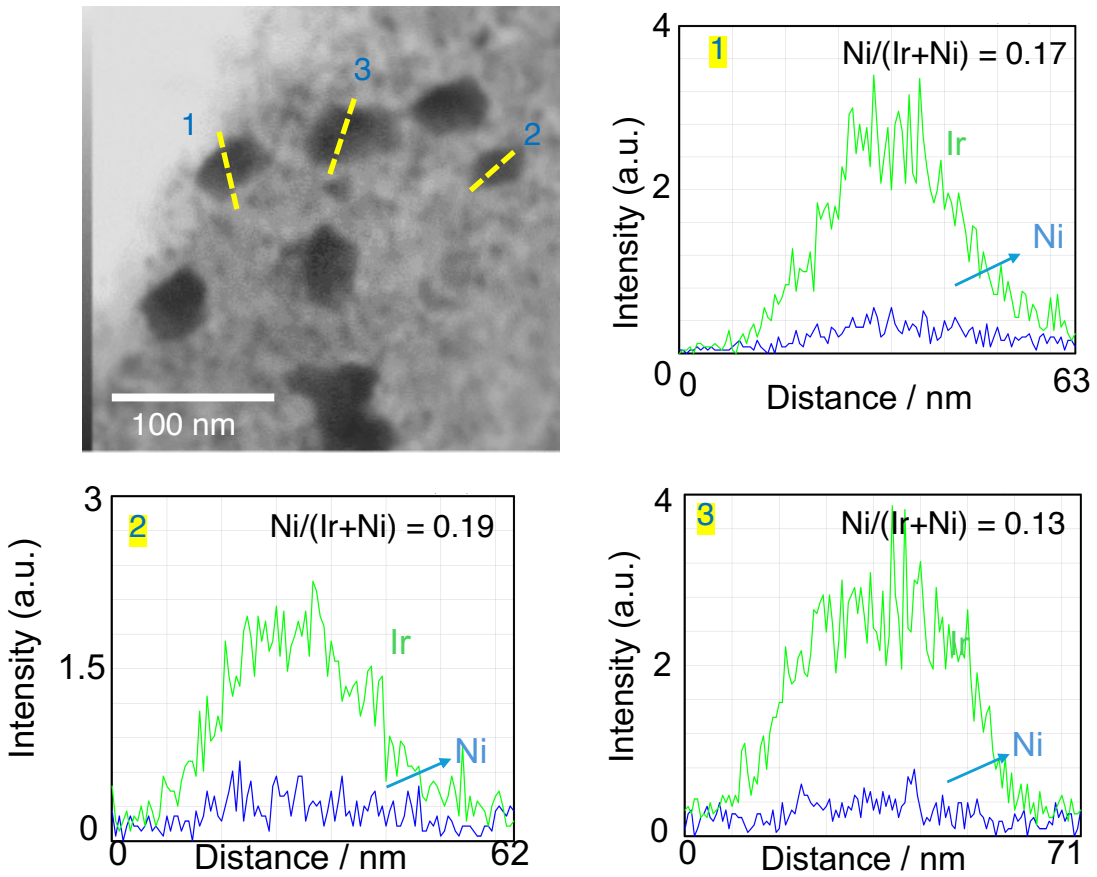

Fig. S5. EDX line scanning spectra of Ir and Ni of three single particles supported on SiO$_2$ (**Ir(CN)$_6$**-Ni/SiO$_2$-0.4).

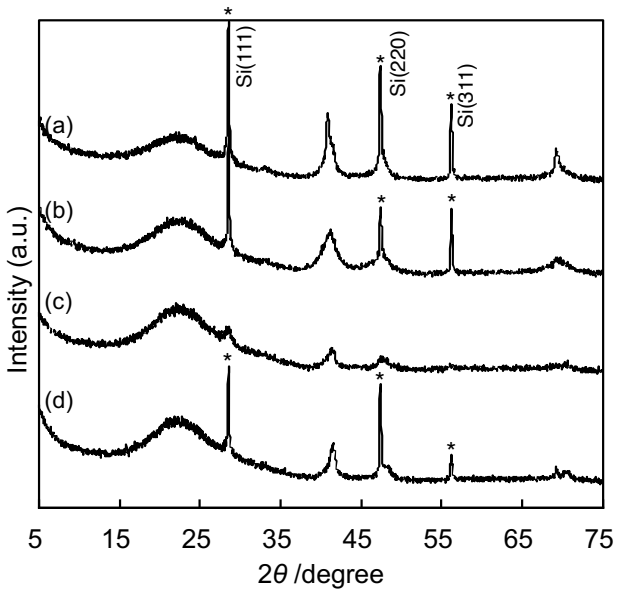

Fig. S6. PXRD patterns of (a) **Ir(CN)$_2$**-Ni/SiO$_2$-0.10, (b) **Ir(CN)$_2$**-Ni/SiO$_2$–0.15, (c) **Ir(CN)$_2$**-Ni/SiO$_2$-0.20 and (d) **Ir(CN)$_2$**-Ni/SiO$_2$-0.40. The peaks with * are ascribed to Si used as internal standard.

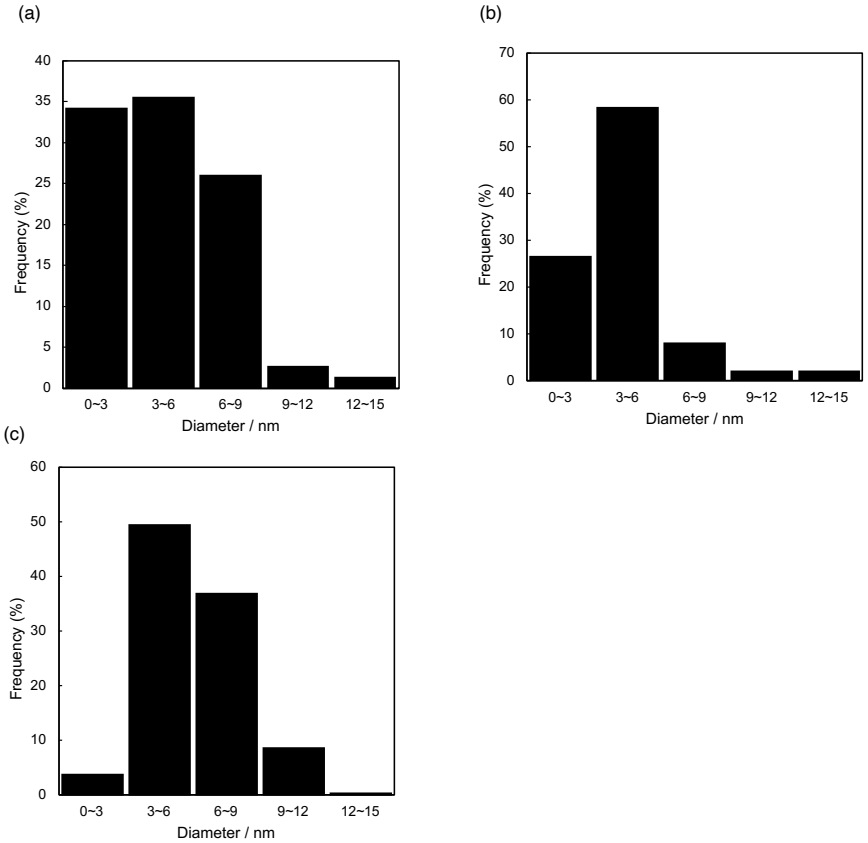

Fig. S7. Size distribution of supported particles of **Ir(CN)$_2$**-Ni/SiO$_2$-X. X = (a) 0.10, (b) 0.15 and (c) 0.40.

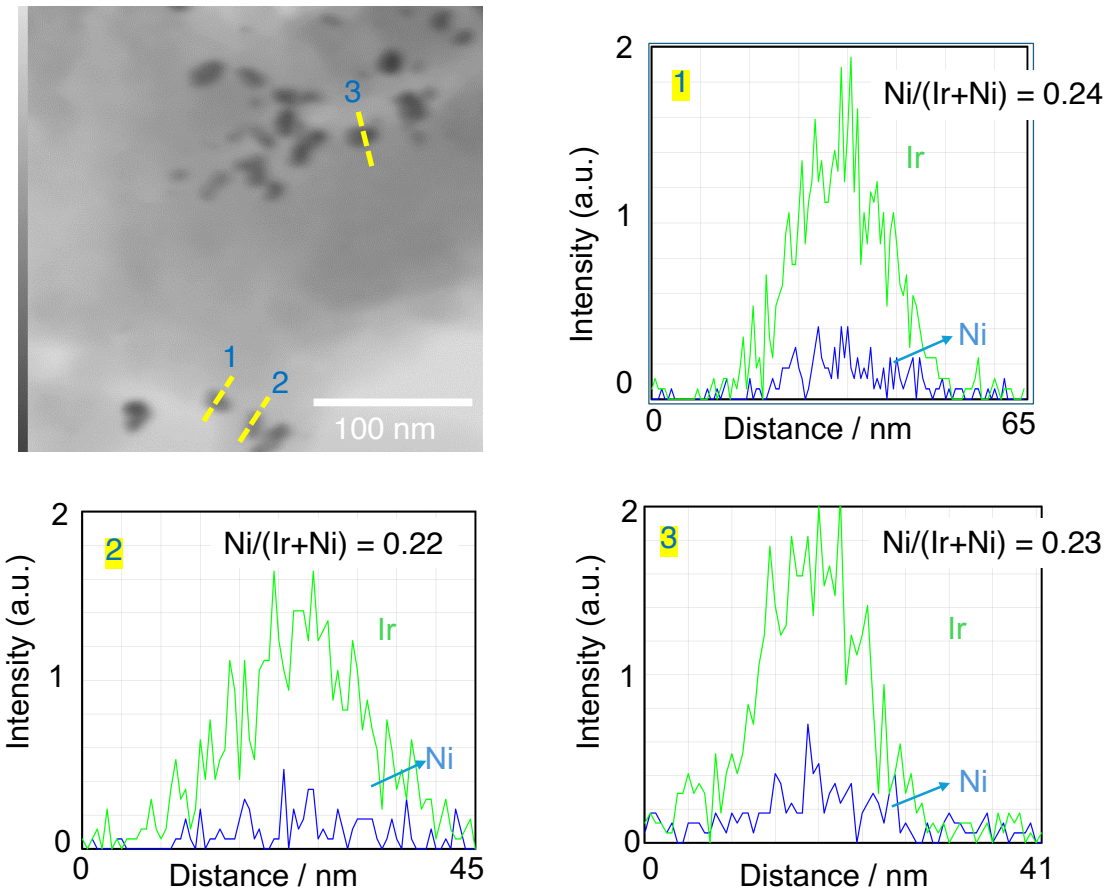

Fig. S8. EDX line scanning spectra of Ir and Ni of three single Ir-Ni particles supported on SiO_2 (**Ir(CN)$_2$**-Ni/SiO_2-0.4).

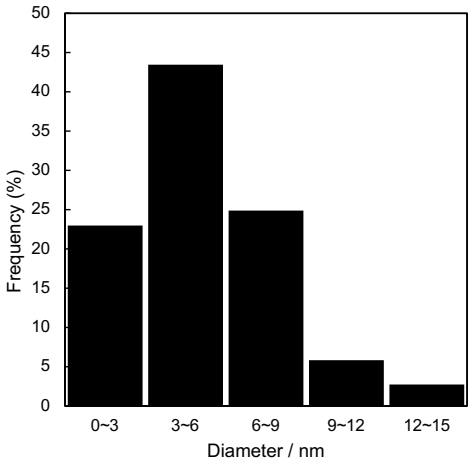

Fig. S9. Size distribution of supported particles of **Ir(CN)$_2$**-Ni/SiO_2-Al_2O_3-0.2.