

Electronic supplementary information

**Light-induced water oxidation by polymorphs of Zn-Co-Ni Oxide spinel
catalyst: A comparative study**

Rahul Sakla,^{a#} Rahul Kaushik,^{a#} Vijay Kumar,^b D. Amilan Jose,^a Amrita Ghosh*^a
and C. R. Mariappan*^b

^aDepartment of Chemistry, NIT-Kurukshetra, Kurukshetra-136119, Haryana, India.
Email: amritaghosh2003@gmail.com

^bDepartment of Physics, NIT-Kurukshetra, Kurukshetra-136119, Haryana, India.
Email: crmari2005@yahoo.com

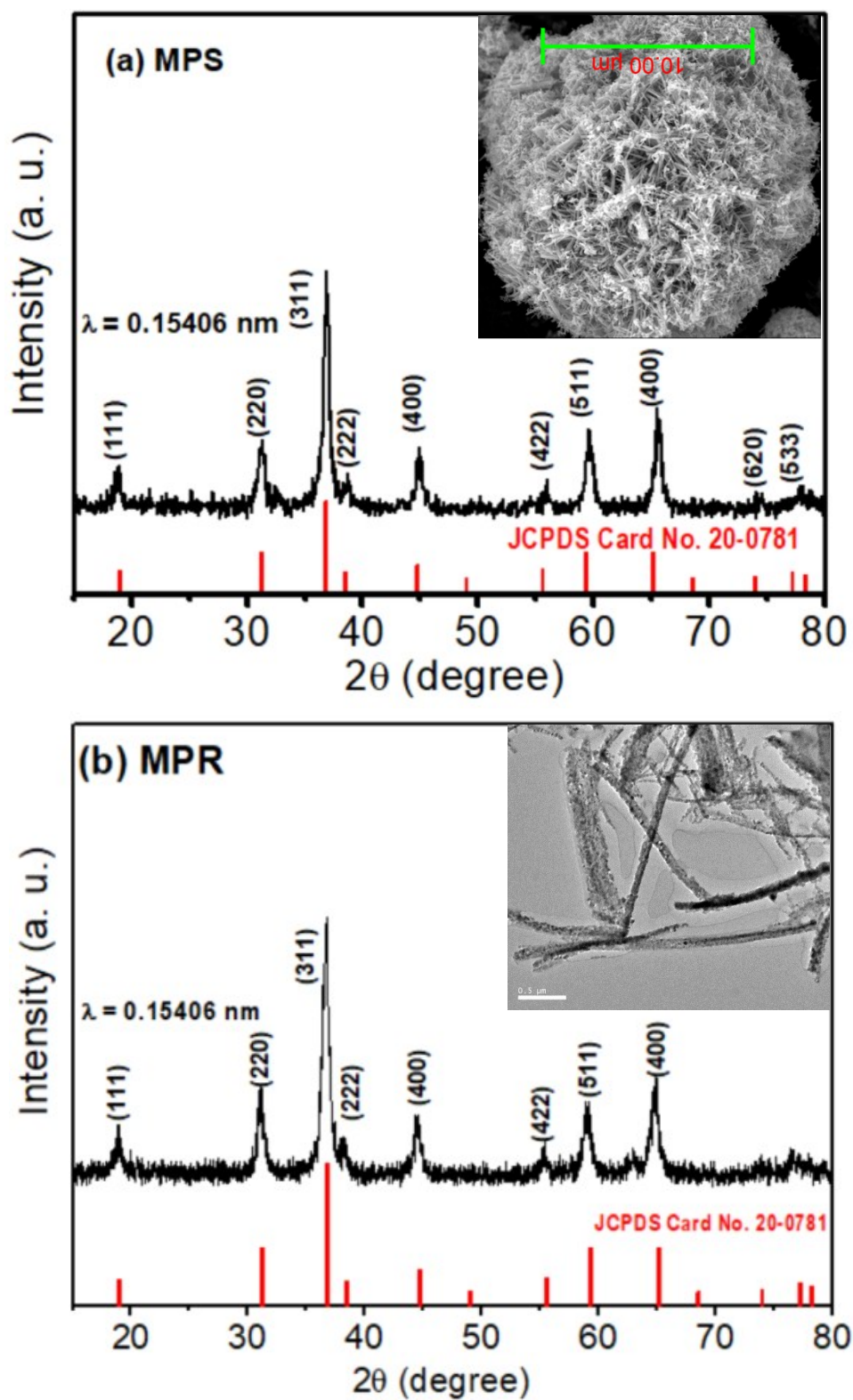


Figure S1: (a) XRD pattern

of 3D highly porous $Zn_{0.2}Ni_{0.8}Co_2O_4$ microspheres. FE-SEM image of $Zn_{0.2}Ni_{0.8}Co_2O_4$ microspheres as the inset figure. (b) XRD pattern of mesoporous $Zn_{0.2}Ni_{0.8}Co_2O_4$ 1D rods. TEM image of $Zn_{0.2}Ni_{0.8}Co_2O_4$ rods as the inset figure.

Fig. S2(a-b)

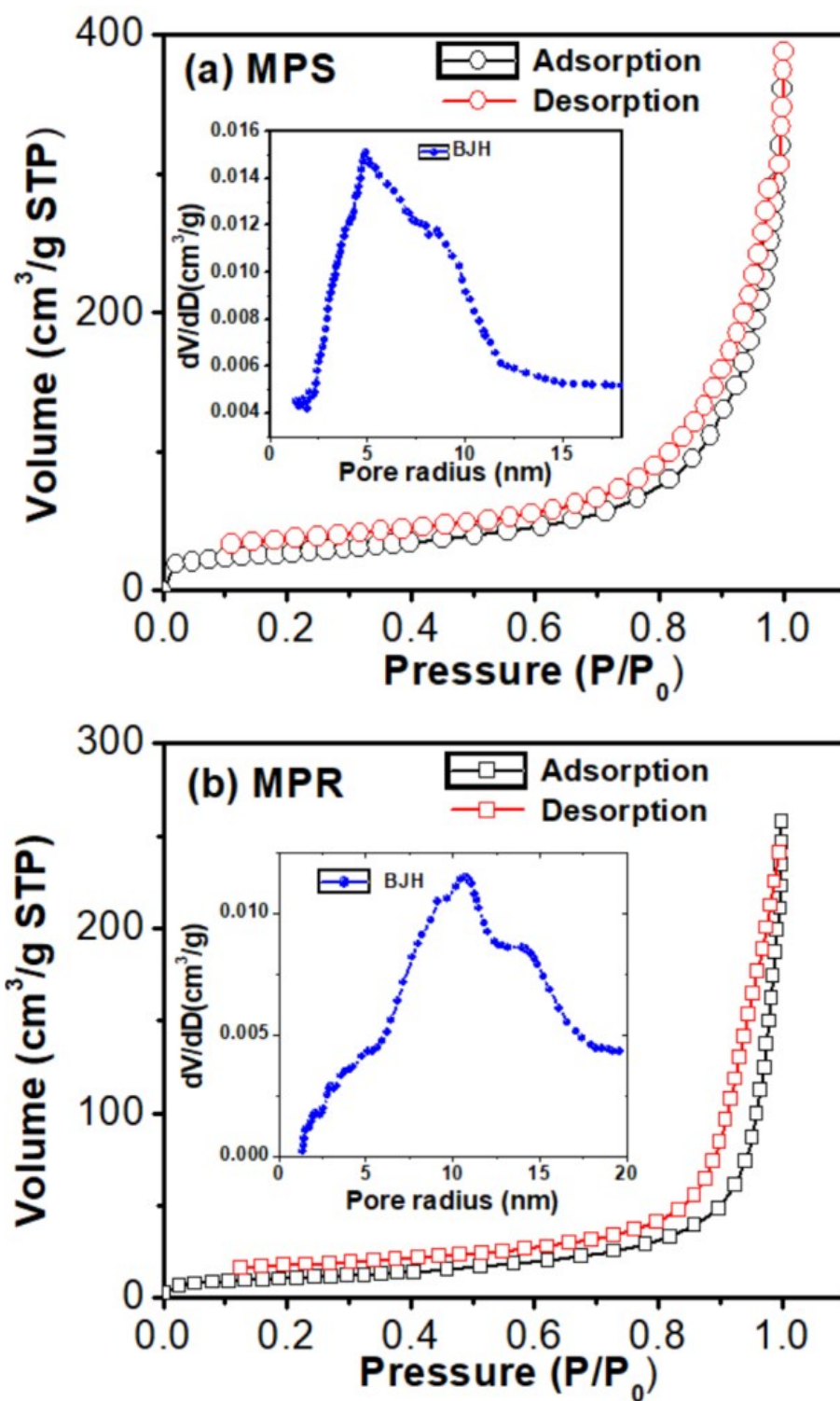


Figure S2: (a) N₂ adsorption–desorption isotherms and the corresponding pore size distribution (inset) of 3D highly porous Zn_{0.2}Ni_{0.8}Co₂O₄ microspheres. (b) N₂ adsorption–desorption isotherms and the corresponding pore size distribution (inset) of mesoporous Zn_{0.2}Ni_{0.8}Co₂O₄ rods

Fig. S3

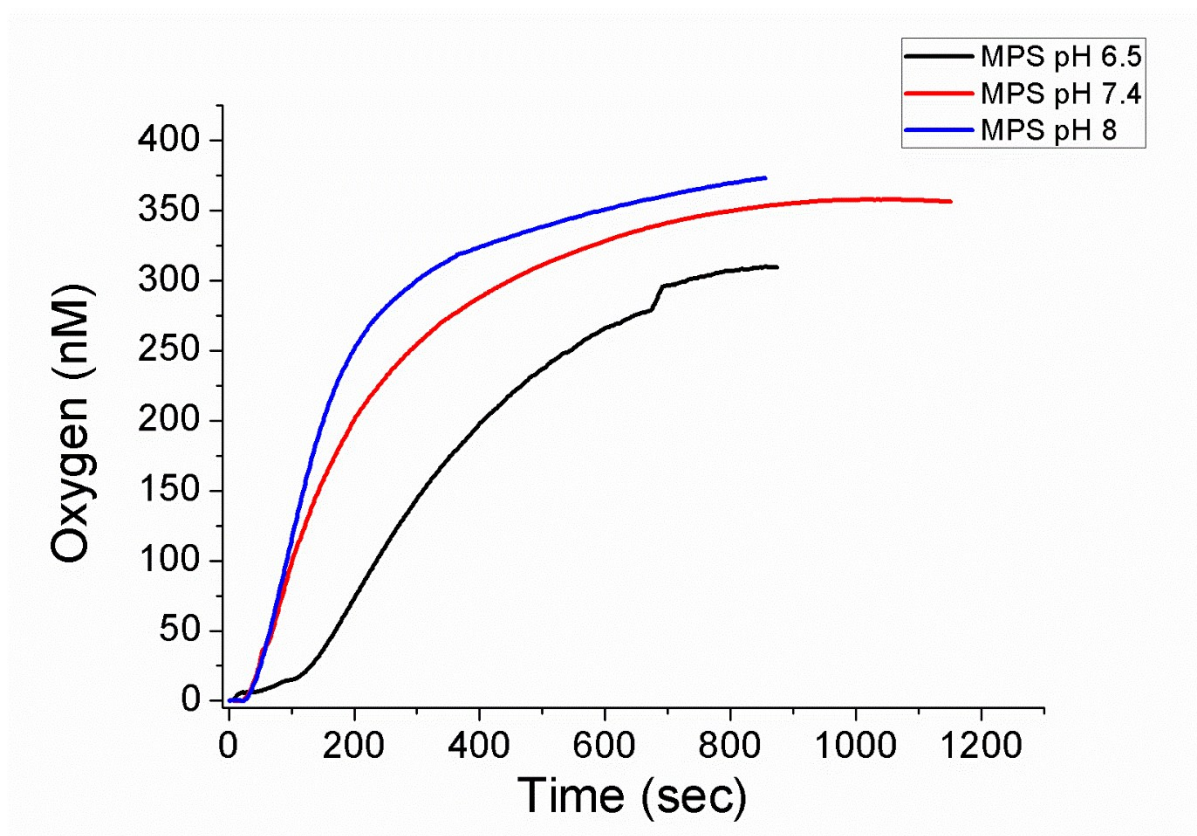


Figure S3: Oxygen evolution in the presence of **MPS** catalyst (3 mg in 2 mL) in different pH range; Ru(bpy)₃²⁺ = 1 mM and Na₂S₂O₈ = 10 mM; Phosphate buffer (10 mM, pH 6.5); Phosphate buffer (10 mM, pH 7.4) and Phosphate buffer (10 mM, pH 8)

Fig. S4(a-b)

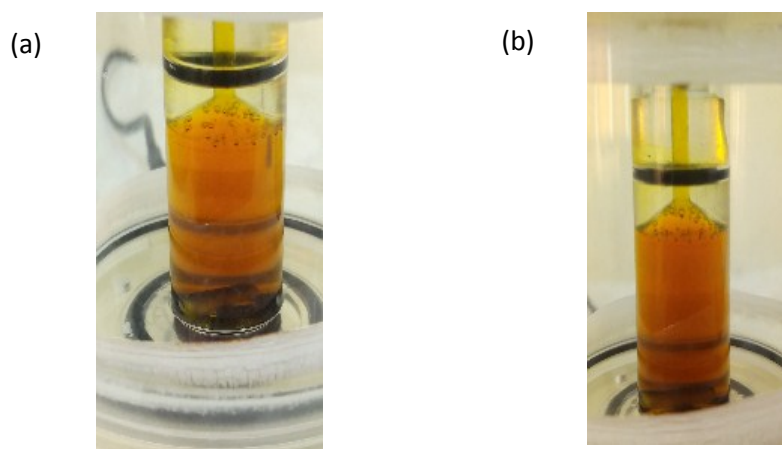


Figure S4: (a) Evolved oxygen in the gas phase with **MPS** (1 mg in 2 mL Phosphate buffer (10 mM, pH 7); $\text{Ru}(\text{bpy})_3^{2+}$ = 1 mM and $\text{Na}_2\text{S}_2\text{O}_8$ = 10 mM). (b) Evolved oxygen in the gas phase with **MPR** (3 mg in 2 mL Phosphate buffer (10 mM, pH 7); $\text{Ru}(\text{bpy})_3^{2+}$ = 1 mM and $\text{Na}_2\text{S}_2\text{O}_8$ = 10 mM).

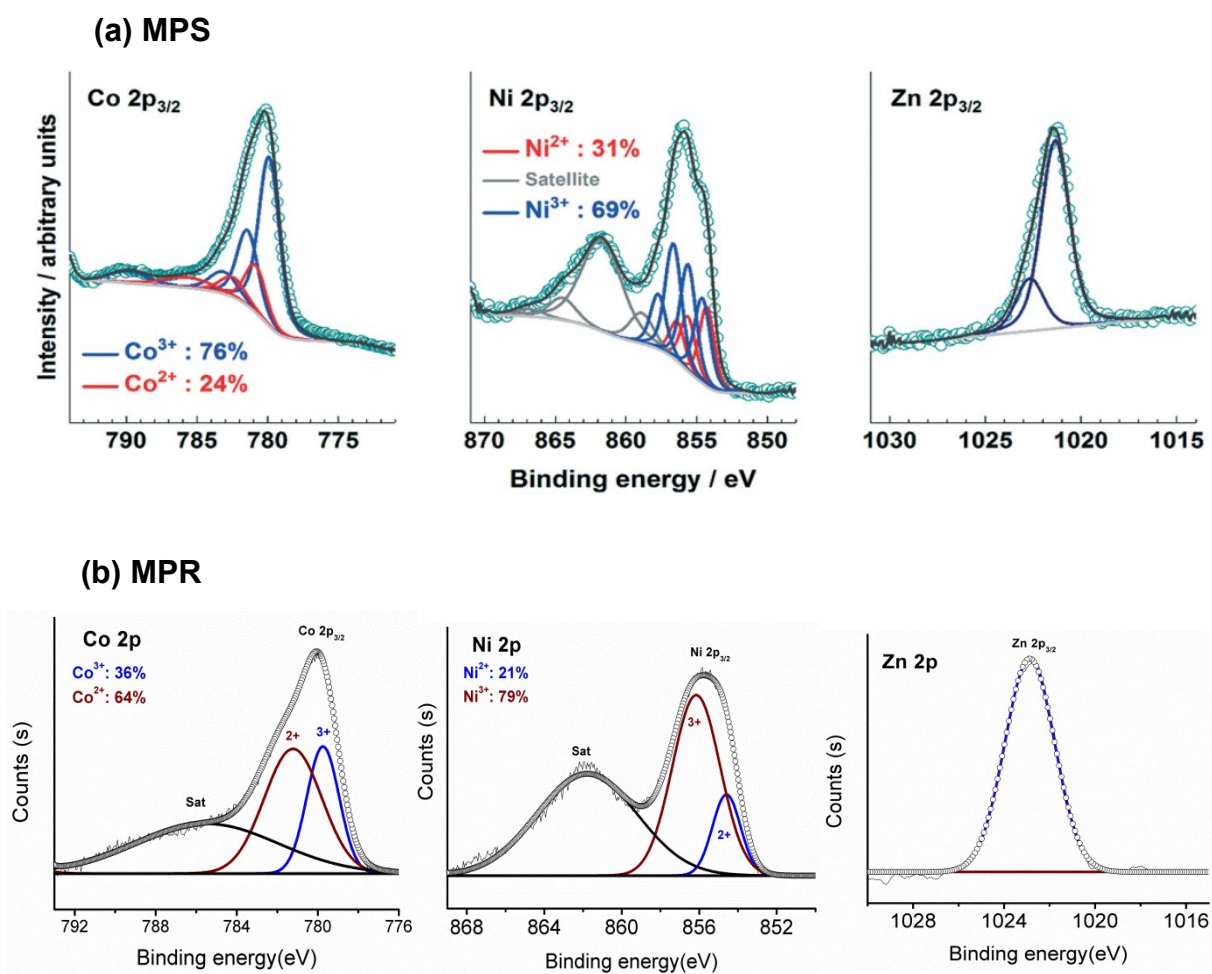


Figure S5: (a) Co 2p_{3/2}, Ni 2p_{3/2}, and Zn 2p_{3/2} XPS spectra of **MPS**. (b) (a) Co 2p_{3/2}, Ni 2p_{3/2}, and Zn 2p_{3/2} XPS spectra of **MPR**.

Fig. S6(a-b)

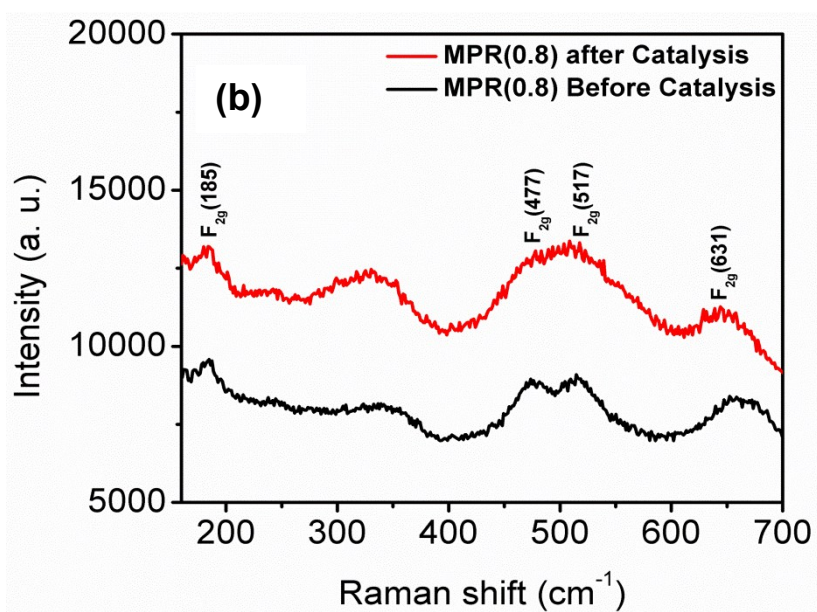
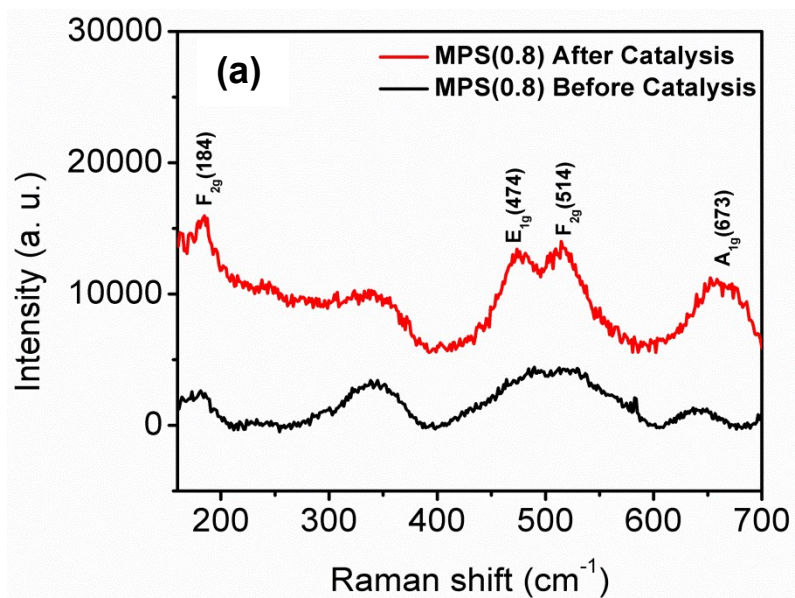


Figure S6: (a) Raman spectra of **MPS** before and after the water oxidation reaction (after the 1st and 5th catalytic cycle). (b) Raman spectra of **MPR** before and after the water oxidation reaction (after the 1st and 5th catalytic cycle).