

### Supporting Information

## Developing a biocatalyst showcasing the synergistic effect of rice husk biochar and bacterial cell for the removal of heavy metals

Soumya Koippully Manikandan<sup>a</sup> and Vaishakh Nair<sup>\*a</sup>

Department of Chemical Engineering, National Institute of Technology Karnataka (NITK), Surathkal, Mangalore – 575025, India.

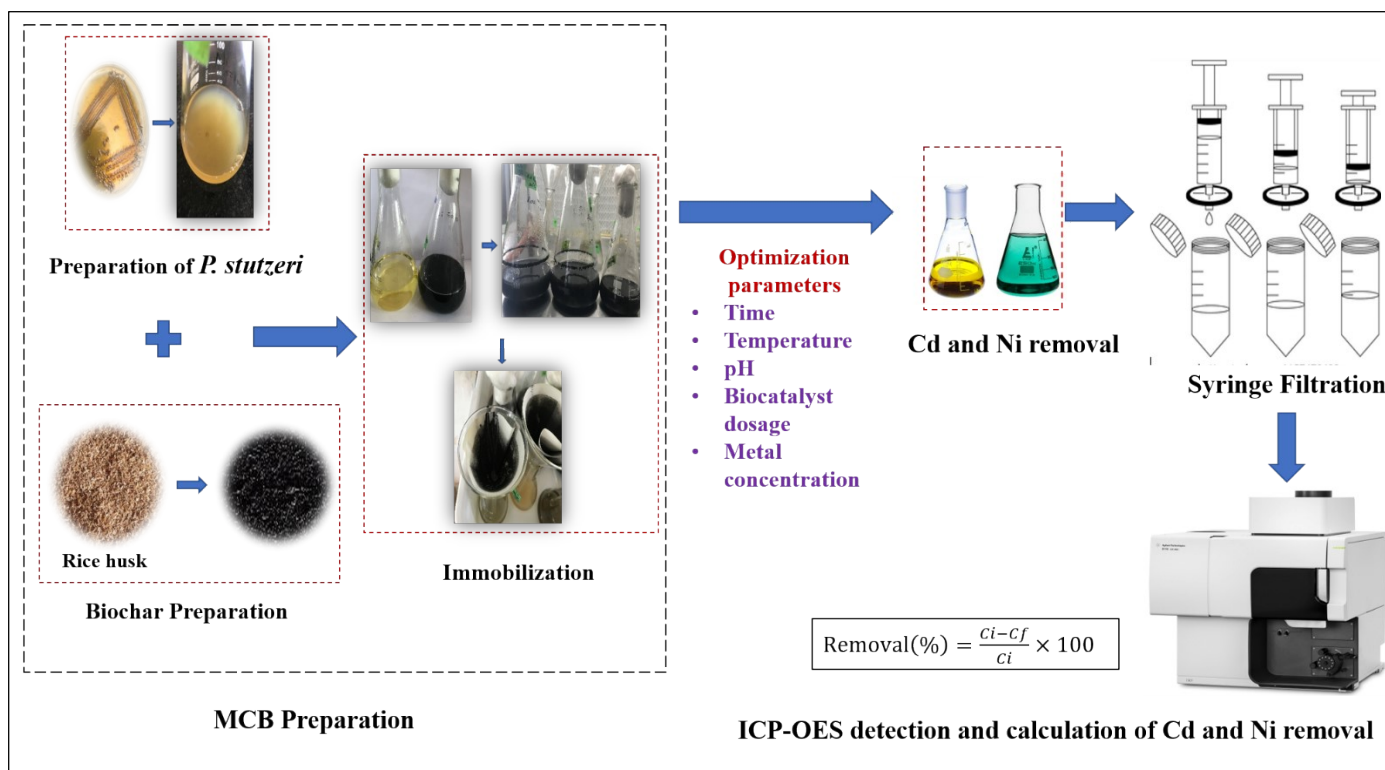
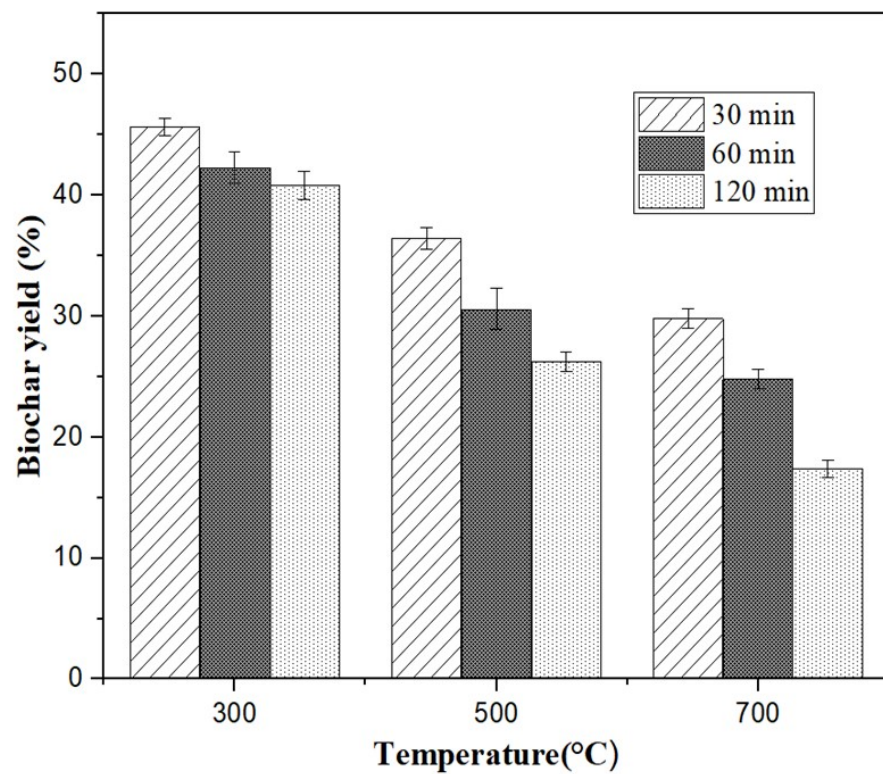


Fig.S1 Experimental design



**Fig.S2** Biochar yield (%) at various temperatures (300°C, 500°C, and 700°C and time (30 mins, 60 mins, 120 mins)

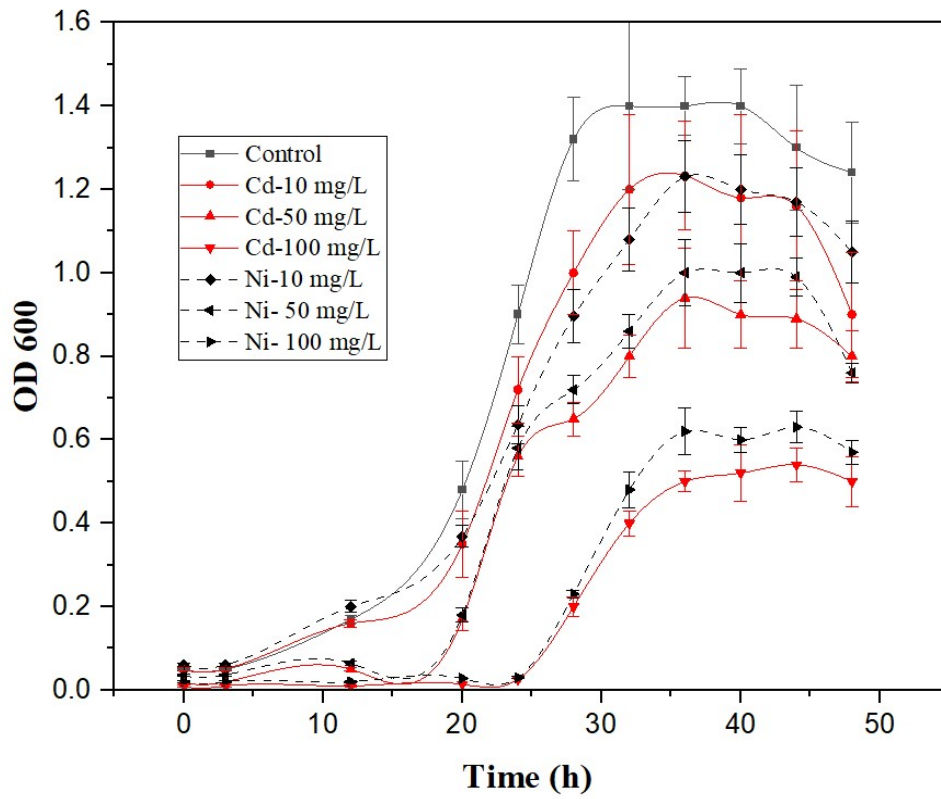
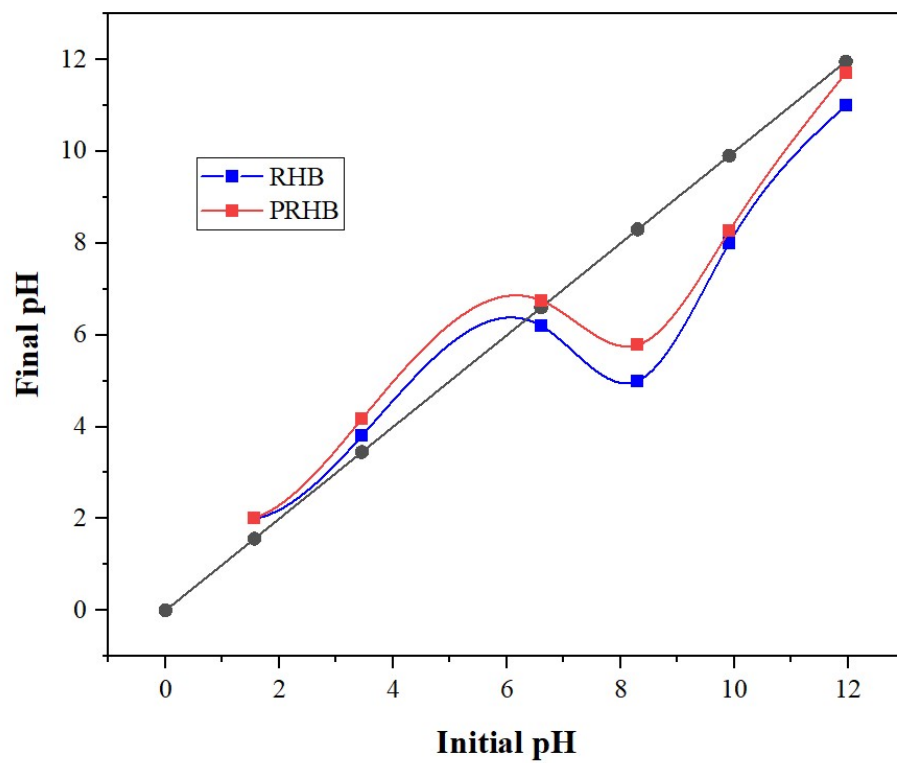
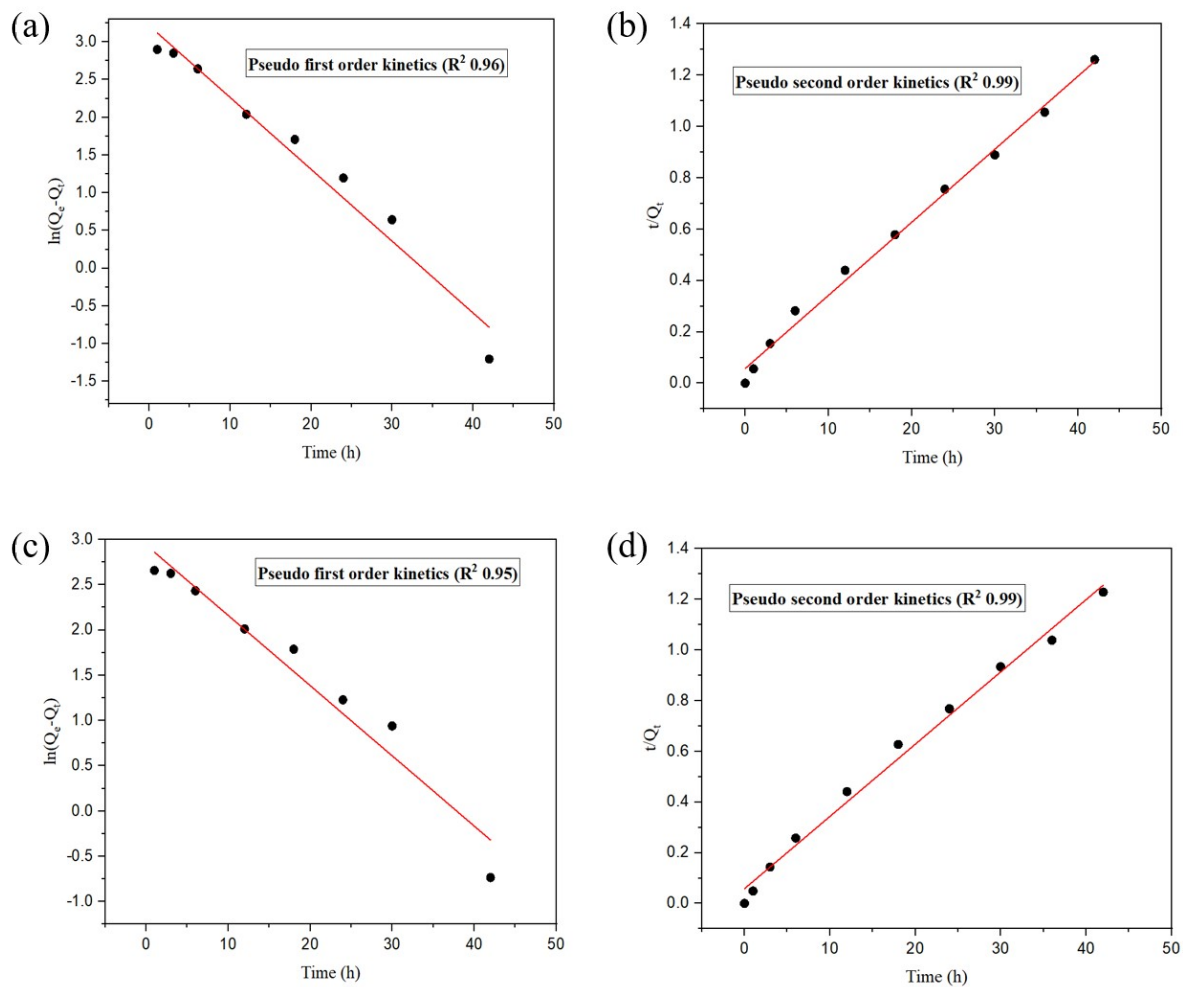


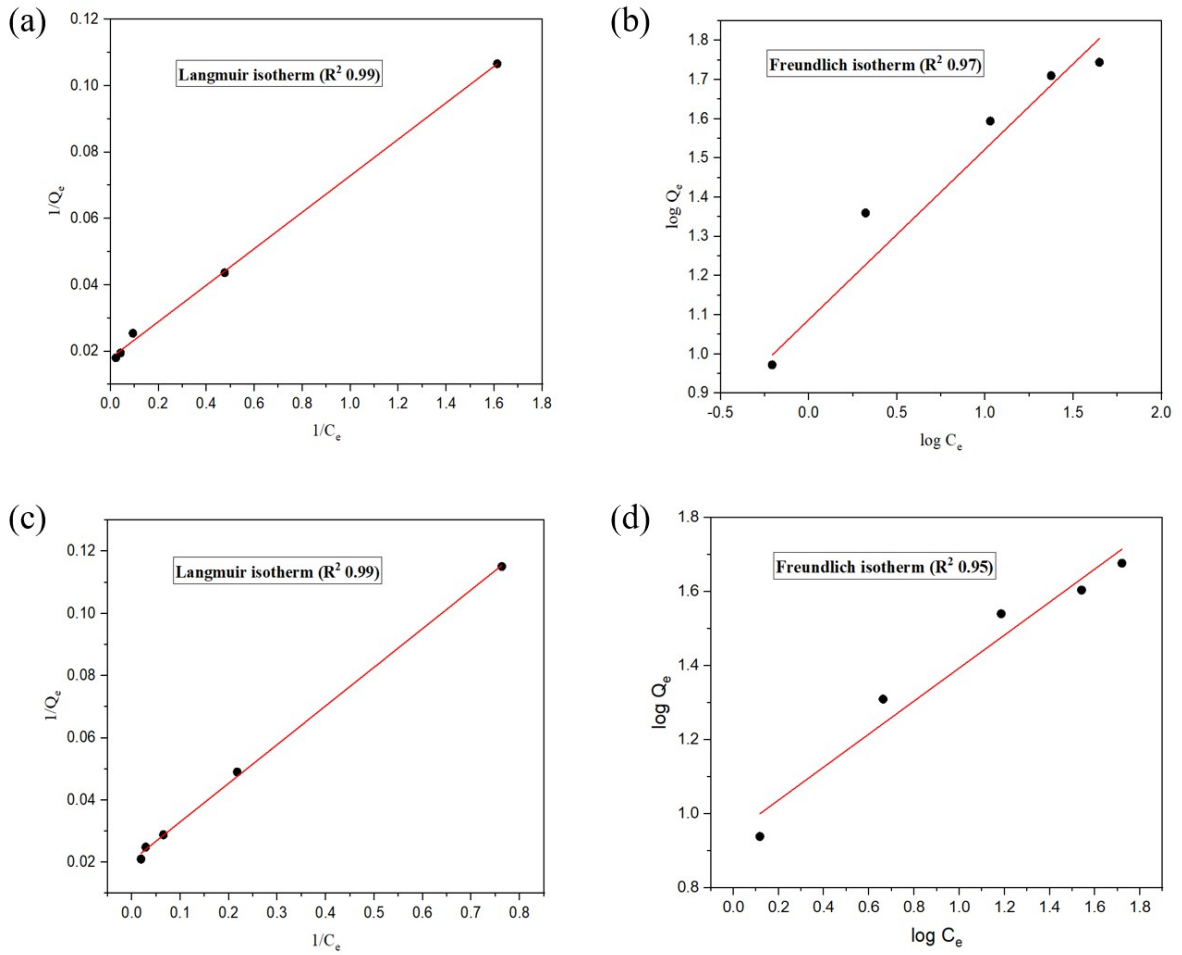
Fig.S3 Cd and Ni tolerance of *P. stutzeri* at 10,50 and 100 mg L<sup>-1</sup> concentration



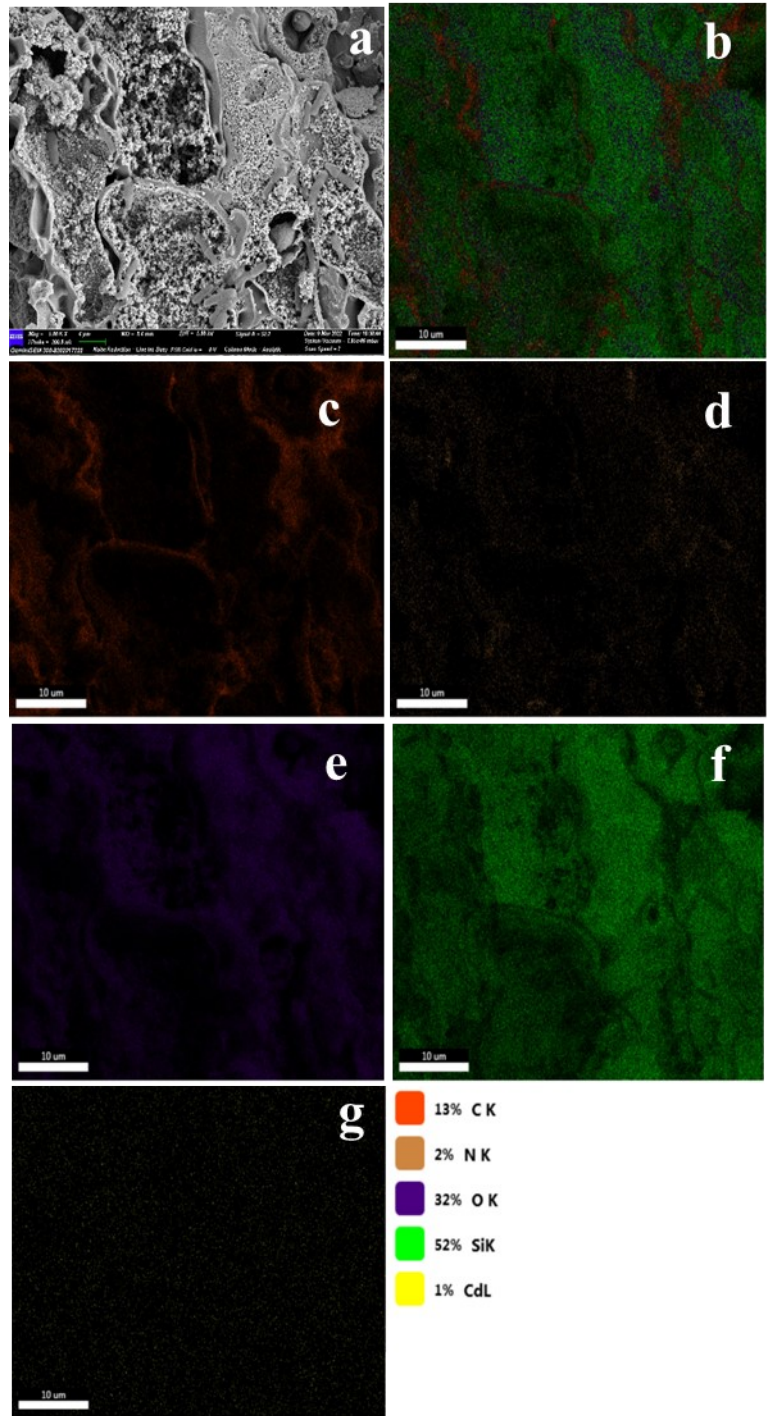
**Fig.S4** Zero-point charge of RHB and PRHB



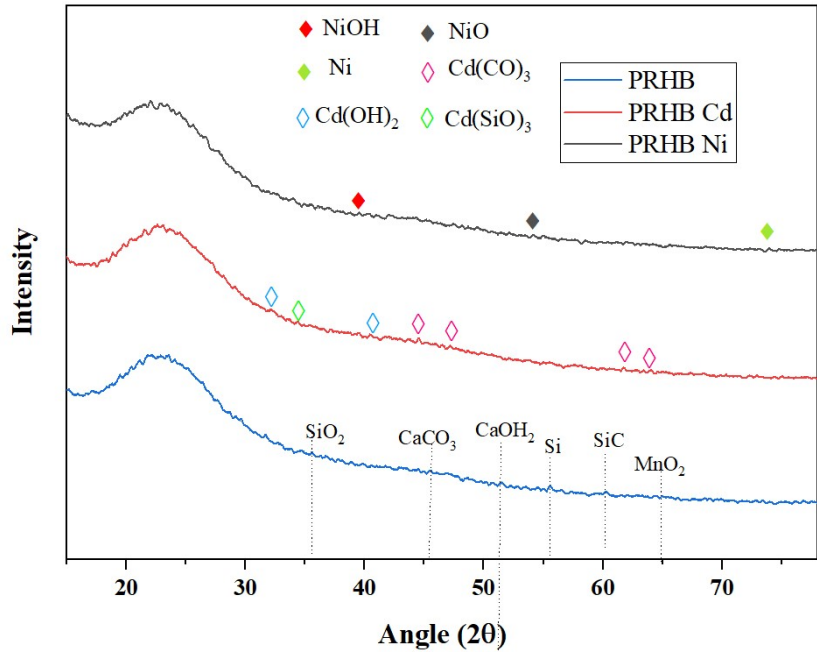
**Fig.S5** Kinetic models for metal ion adsorption by PRHB (a) pseudo–first order and (b) pseudo–second order model of Cd adsorption (c) pseudo–first order and (d) pseudo–second order model of Ni adsorption



**Fig.S6** Isotherm models for metal ion adsorption by PRHB; (a) Langmuir and (b) Freundlich isotherm models for Cd adsorption (c) Langmuir and (d) Freundlich isotherm models for Ni adsorption

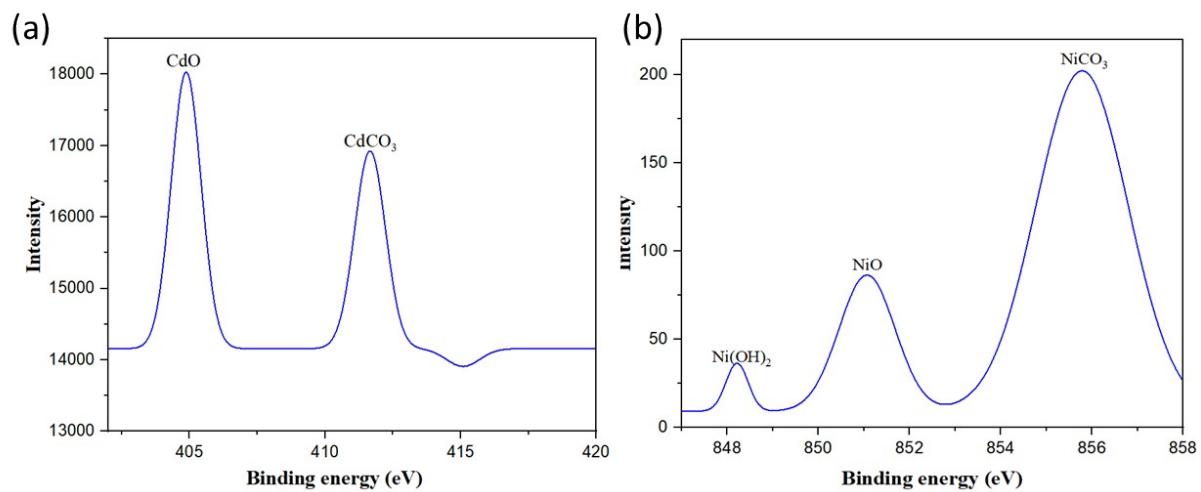


**Fig.S7** (a) FE SEM image of PRHB after Cd removal (b) distribution of all the elements (c) elemental mapping of carbon (d) nitrogen (e) oxygen (f) silica and (g) cadmium.



**Fig.S8** XRD spectra of PRHB before and after Cd and Ni treatment





**Fig.S9** XPS spectra of (a) Cd 3d and (b) Ni 2p