

## Supporting Information

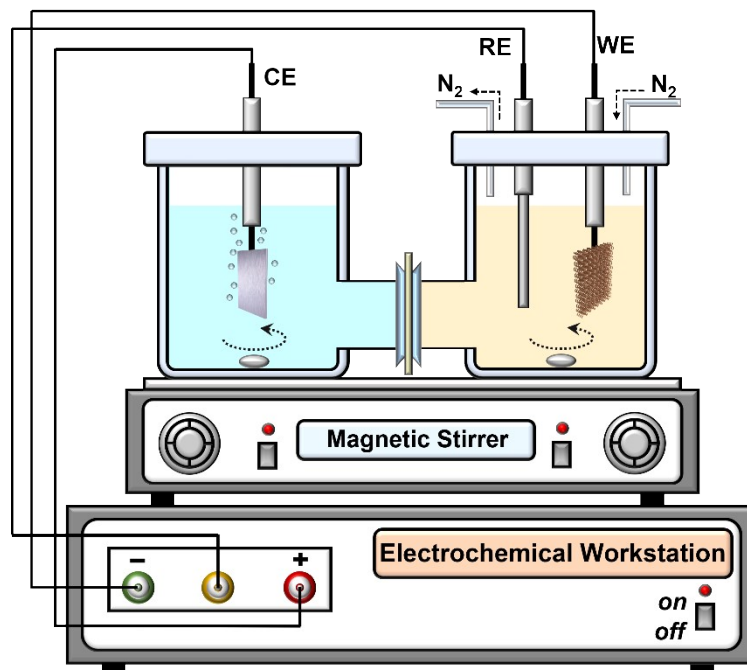
### **Preparation of phosphorus-doped copper-nickel electrode and its application in Electro-hydrogenation of 5-HMF**

Yu Liu <sup>a</sup>, Yiyi Peng <sup>a</sup>, Yan Zhong <sup>a</sup>, Ruquan Ren <sup>a</sup>, Yongming Fan <sup>a,\*</sup>

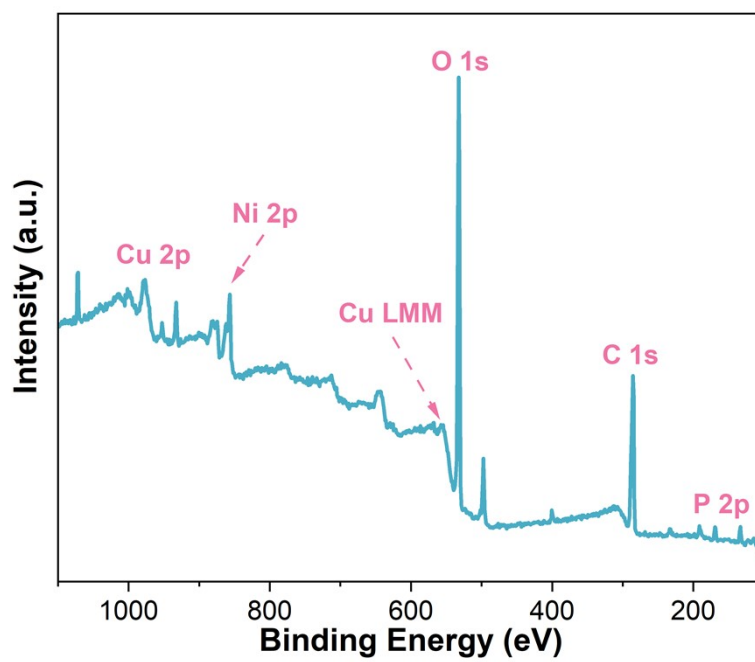
*<sup>a</sup>. College of Material Science and Technology, Beijing Forestry University, Beijing,  
100083, China*

\*: Corresponding authors.

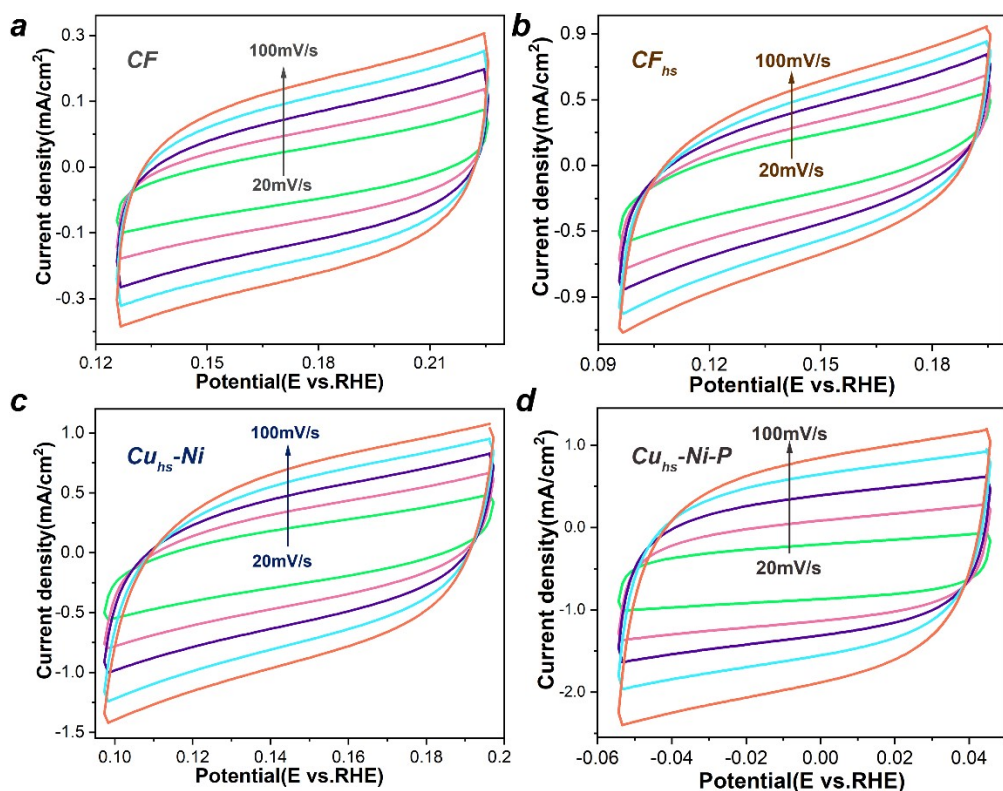
*E-mail addresses: fanym@bjfu.edu.cn (Y. Fan).*



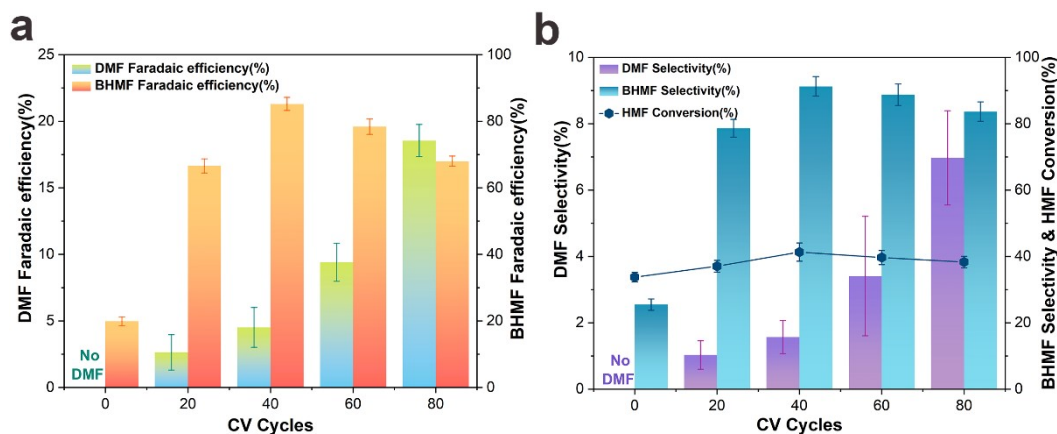
**Fig. S1.** Schematic diagram of the electrolysis experimental device.



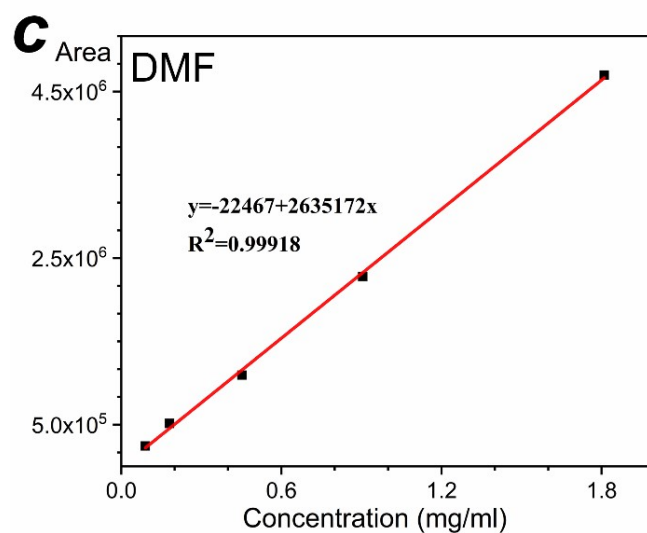
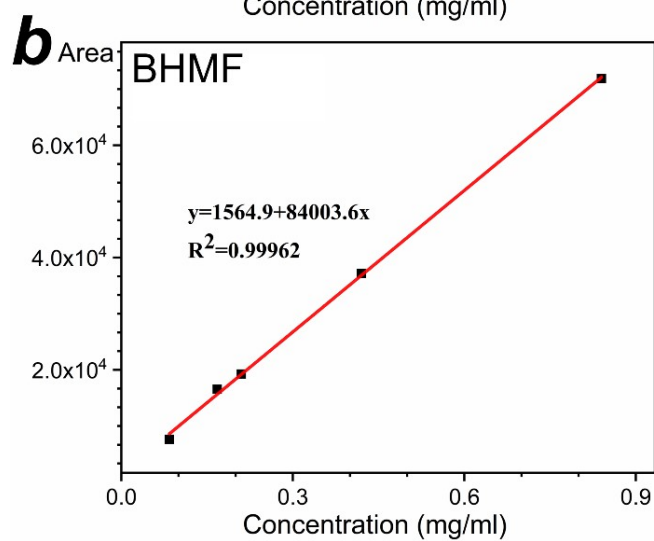
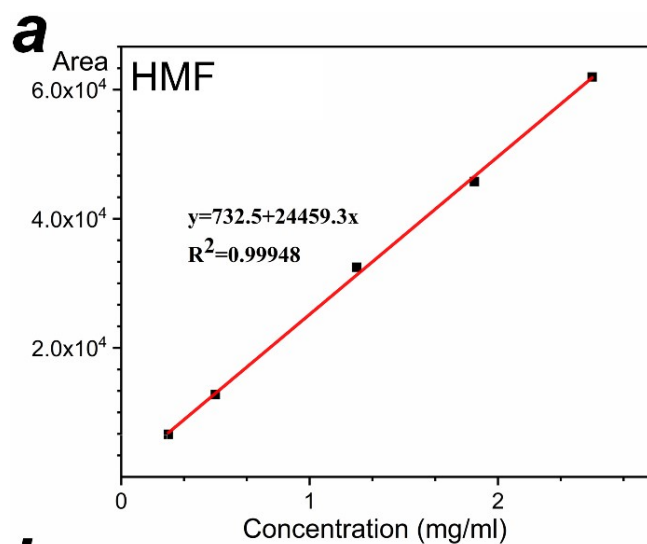
**Fig. S2.** XPS spectra of Cuhs-Ni-P/CF bimetallic electrodes



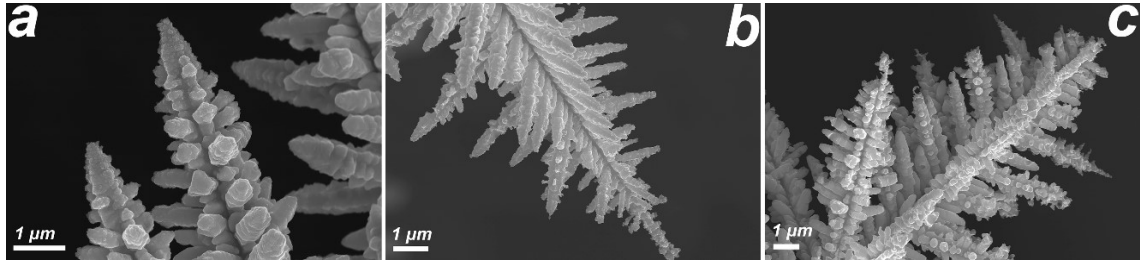
**Fig. S3.** Cyclic voltammety curves of (a)CF, (b) high surface area CF, (c) Cu<sub>hs</sub>-Ni/CF and (d) Cu<sub>hs</sub>-Ni-P/CF electrodes. Conditions: 20mM FF, pH:8.0.



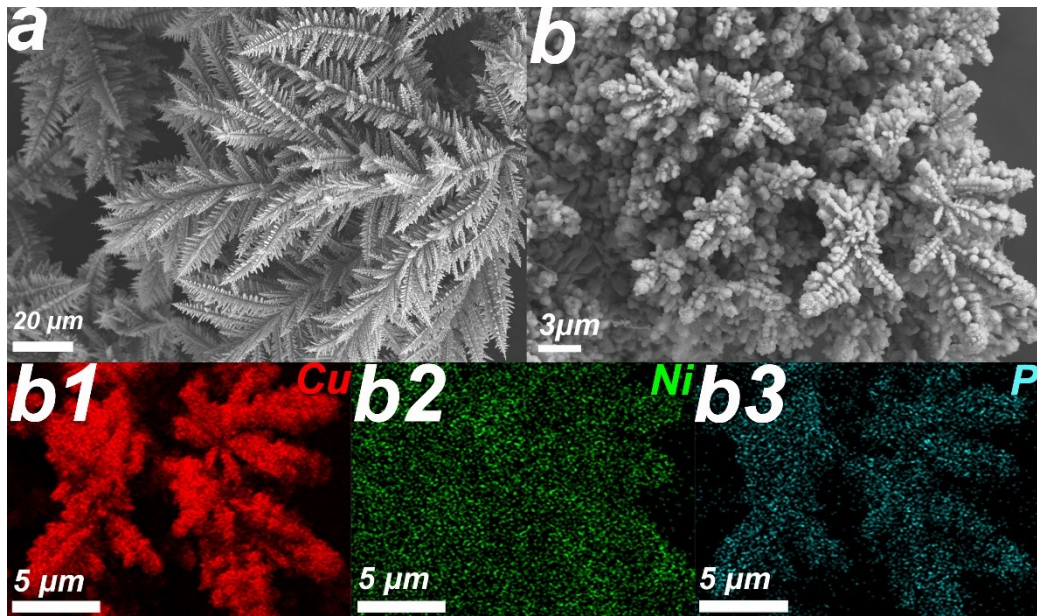
**Fig.S4.** (a) Faradaic efficiency and (b) selectivity of the electro-catalytic reduction of HMF on the electrode with different Ni deposition time. Conditions: 20mM HMF, pH=8.0, voltage: -1.0 V vs. Ag/AgCl, charge: 50 C



**Fig.S5.** Standard curve of (a) HMF; (b) BHMF and (c) DMF.



**Fig.S6.** SEM images of (a)  $\text{Cu}_{\text{hs}}$ /CF electrode; (b)  $\text{Cu}_{\text{hs}}\text{-Ni}$ /CF electrodes and (c)  $\text{Cu}_{\text{hs}}\text{-Ni-P}$ /CF electrodes



**Fig.S7.** (a) SEM images of the  $\text{Cu}_{\text{hs}}\text{-Ni-P}$ /CF; (b) SEM images of the post-electrolysis  $\text{Cu}_{\text{hs}}\text{-Ni-P}$ /CF electrodes; (b1-3) elemental mapping of the post-electrolysis  $\text{Cu}_{\text{hs}}\text{-Ni-P}$ /CF electrode.