

## Supporting information

### **Hydrophobic asymmetry ultrafiltration PVDF membranes: an alternative prospective separator for VFB with excellent stability**

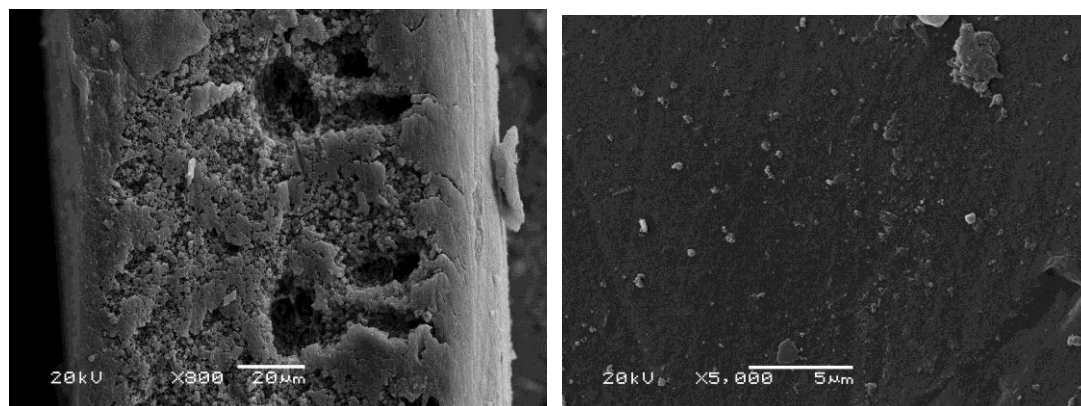
Wenping Wei<sup>a,b</sup>, Huamin Zhang<sup>a,\*</sup>, Xianfeng Li<sup>a,\*\*</sup>, Zhensheng Mai<sup>a,b</sup>, Hongzhang Zhang<sup>a,b</sup>, Yun Li<sup>a,b</sup> and Ivo Vankelecom<sup>c</sup>

<sup>a</sup> Division of energy storage, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian 116023, P.R. China

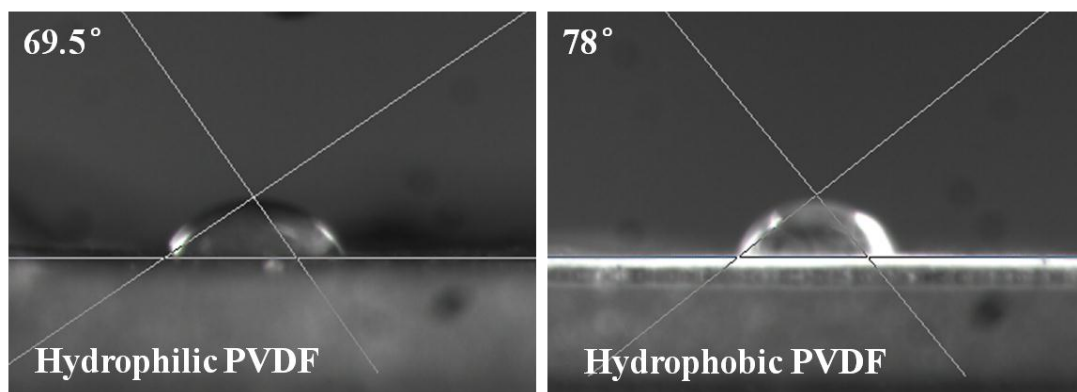
Email: zhanghm@dicp.ac.cn; lixianfeng@dicp.ac.cn

<sup>b</sup> Graduate University of the Chinese Academy of Sciences, Beijing 100039, P.R. China

<sup>c</sup>Centre for Surface Chemistry and Catalysis, Faculty of Bioscience Engineering, Katholieke Universiteit Leuven (K.U.Leuven), Kasteelpark Arenberg 23 – Box 2461, B-3001 Leuven, Belgium.



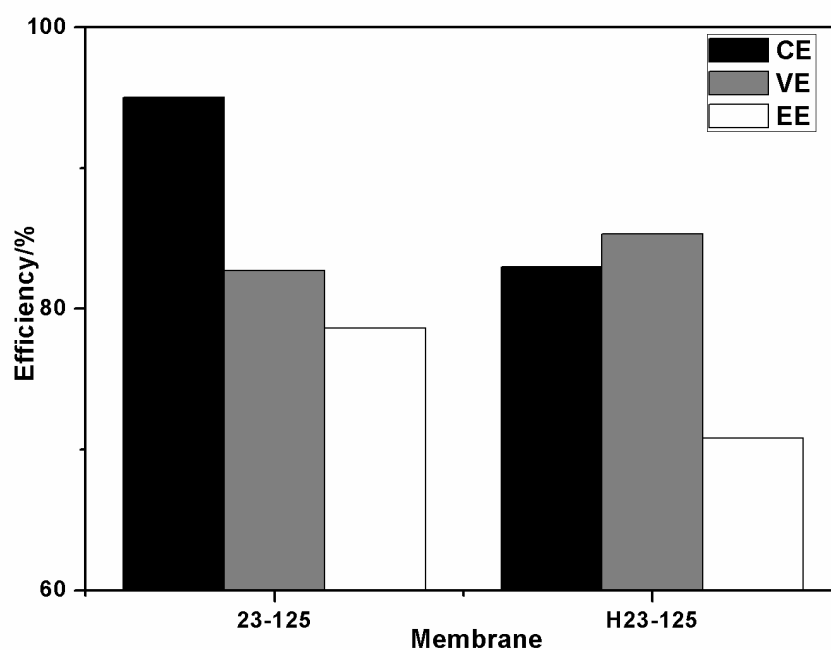
**Fig. 1S** Morphology of M-23-125 after 1000 cycles test



**Fig. 2S** Water contact angle of PVDF before and after hydrophilic treatment.

**Table 1S** Permeability of hydrophilic PVDF membranes

membrane	Proton permeability( $10^{-7}$ )	Vanadium permeability( $10^{-7}$ )
M-23-125	97.5	7.9
HM-23-125	198.6	19.2



**Fig. 3S** Single cell performance of hydrophilic PVDF membranes.