Supplementary Information

Proton-conductive channels engineering of perfluorosulfonic acid membrane via in-situ acid-base pair of metal organic framework for fuel cells

Wenxing Zhang[a,b,&], Shengqiu Zhao[a,b,&], Rui Wang[a,b], Aojie Zhang[a,b], Yi Huang[c], Haolin Tang[a,b*]

[a] *State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan University of Technology, Wuhan 430070, China*

[b] *Foshan Xianhu Laboratory of the Advanced Energy Science and Technology Guangdong Laboratory, Xianhu Hydrogen Valley, Foshan 528200, China*

[C] *State Key Laboratory of Automotive Safety and Energy, School of vehicle and mobility, Tsinghua University, 100084, Beijing, China*

* Corresponding author.

Email: thln@whut.edu.cn (Haolin Tang)

∗Haolin Tang.

E-mail address: thln@whut.edu.cn

[&] These authors contributed equally to this work.

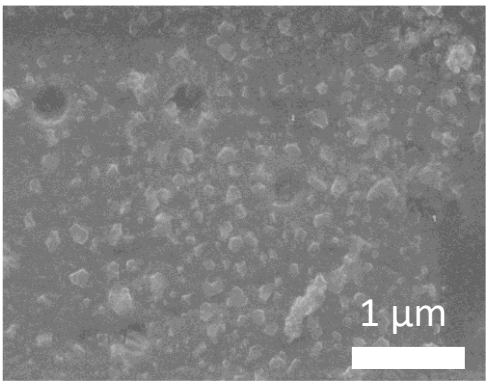

Figure S1. The surface-view SEM images of PFSA-NH-Zr-5.

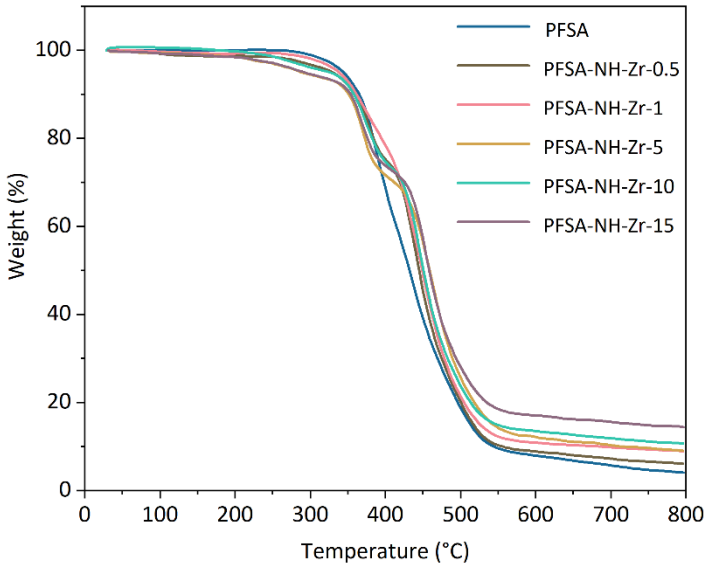

Figure S2. TGA curves of PFSA membrane and various hybrid membranes.

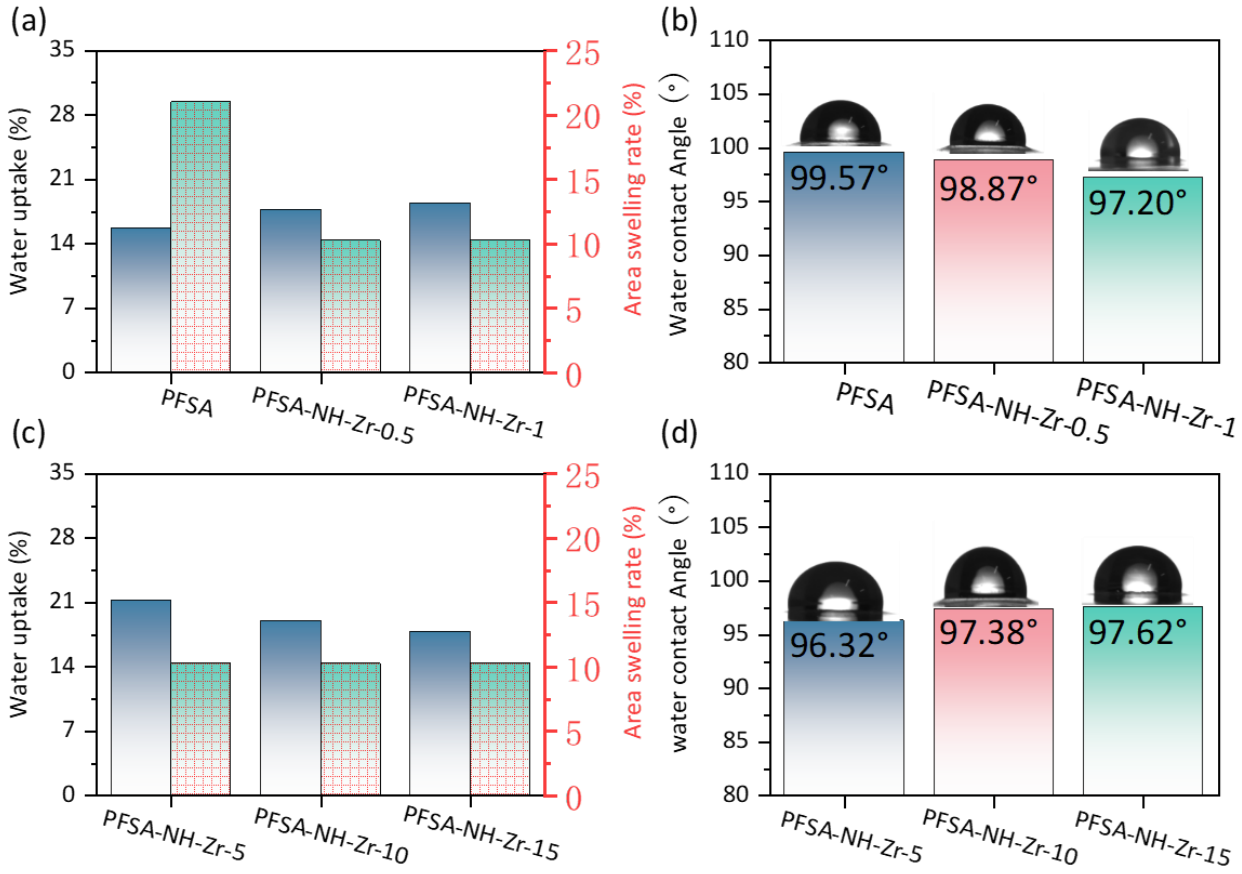

Figure S3. (a,c) WUs, SRs, and (b,d) Water contact angle of PFSA membrane and various hybrid membranes.

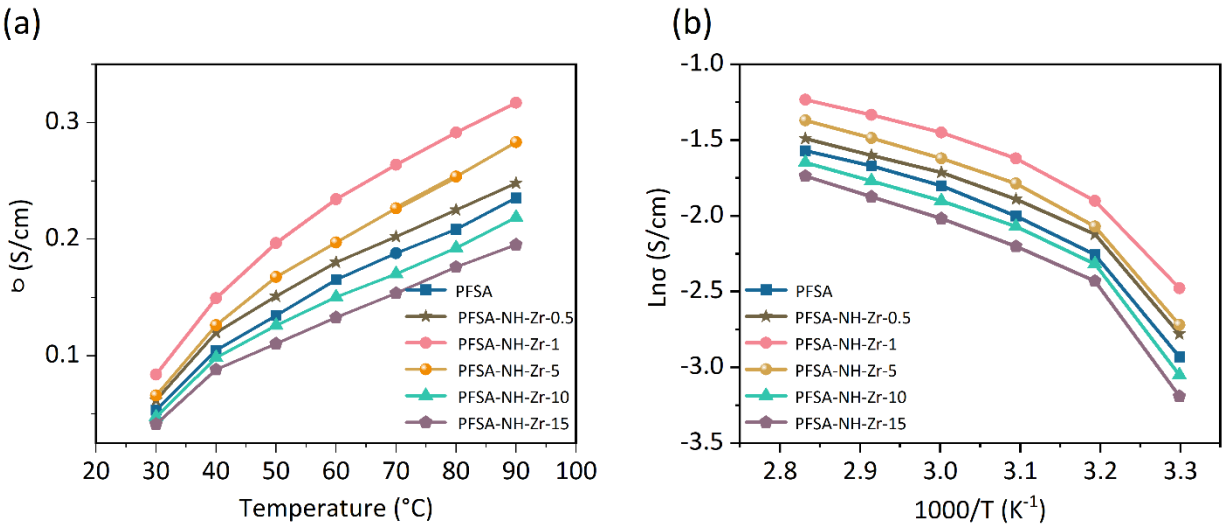

Figure S4. Physicochemical properties of PFSA membrane and various hybrid membranes. (a) Proton conductivity under 100% RH. (b) Arrhenius energy of proton conductivity under 100% RH.

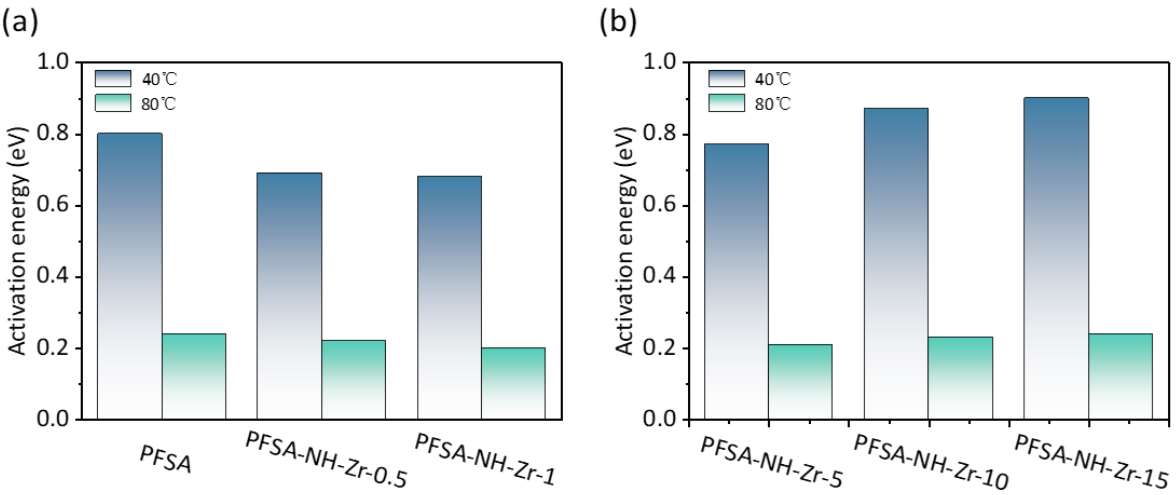

Figure S5. (a,b) The activation energy of the proton conduction under 40°C and 80°C of PFSA membrane and various hybrid membranes.

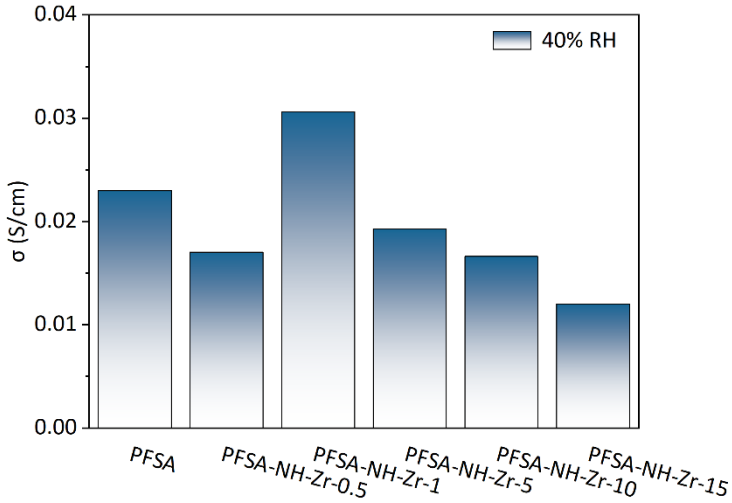

Figure S6. Proton conductivities at 80 °C and 40% RH of PFSA membrane and various hybrid membranes.

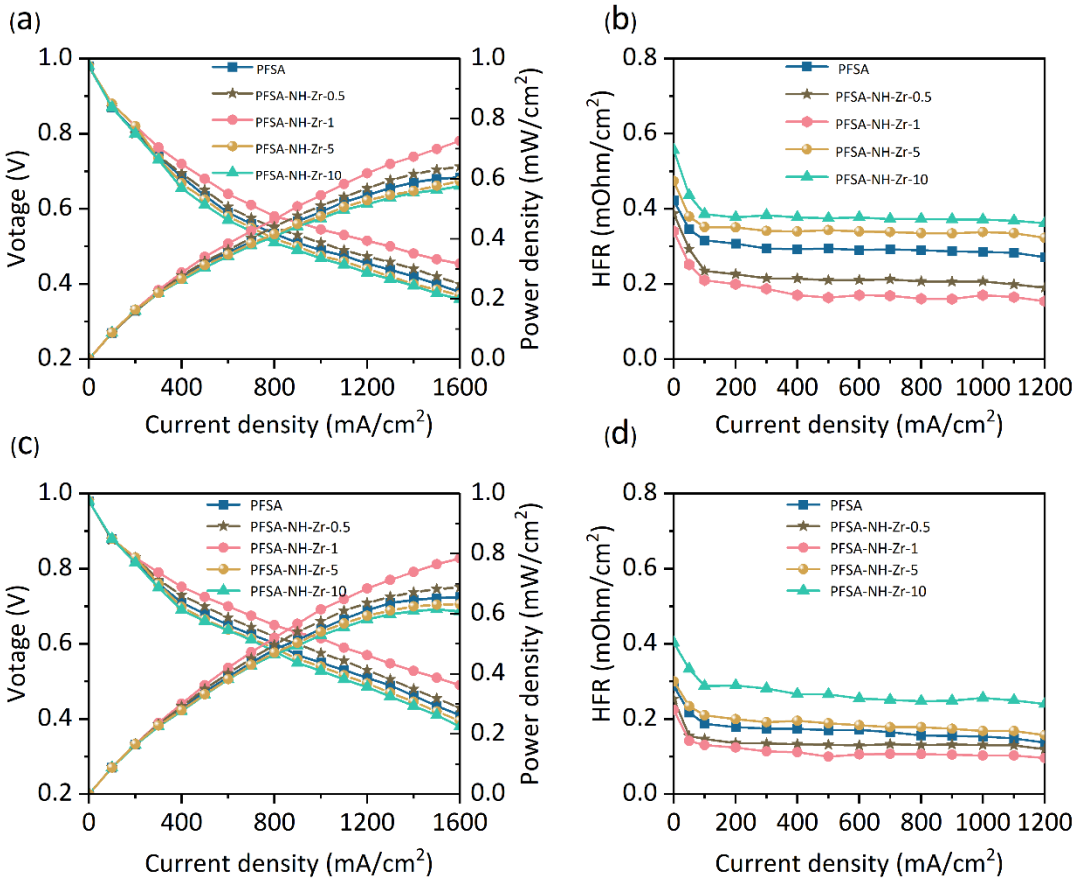

Figure S7. Polarization curves of PEMFC with test membranes at (a) 40% RH and (c) 100% RH. Current density of the membranes versus HFR at (b) 40% RH and (d) 100% RH.