

## EPFL Valais/Wallis SEMINAR

07. February 2022, 11:00-12:00, EPFL Valais/Wallis ZOOM Seminar

### **Anode-Electrolyte Interface Engineering and Mechanism of Aluminum-Air Fuel Cell**

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As the reserves of fossil fuel are declining, novel energy power generation technologies have been promoted. Aluminum-air fuel cells (AAFC) attract more attention due to their high specific energy, low cost and friendly environment [1]. At present, neutral or alkaline solution is usually used as electrolyte for aqueous AAFC, and stronger discharge performance is demonstrated in alkaline because the standard electrode potential of aluminum is higher. However, once the highly reducing aluminum atoms meet with water molecules and hydroxide ions, hydrogen is released quickly, which reduces the utilization of anode greatly. The AAFC is limited by the aluminum self-corrosion, and has not been able to give full play to its advantages [2]. Herein, we propose an AAFC using a mesh-encapsulated anode, where the energy redistribution can be achieved by adding zinc containing compounds to the potassium hydroxide solution, and the anode efficiency and capacity of the fuel cell can be highly improved by recovering the dead zinc deposited on the aluminum surface with the help of a mesh. The aluminum-zinc energy transfer of the AAFC achieves the inhibition of aluminum self-corrosion and completes recovery and utilization of dead zinc, which promotes the large-scale application of fuel cells.

#### References:

- [1] Z. Luo, L. Yin, et al. AuPt nanoparticles/ multi-walled carbon nanotubes catalyst as high active and stable oxygen reduction catalyst for Al-air batteries. *Applied Surface Science*, 2021: 150474.
- [2] B. J. Hopkins, S. H. Yang, et al. Suppressing corrosion in primary aluminum-air batteries via oil displacement. *Science*, 2018. 362(6415): p. 658-661.



#### **CV: Manhui Wei**

Born in 1994 in Tianjin, China, Manhui Wei graduated with a B.E. in Marine Engineering from Dalian Maritime University in 2017. He obtained an M.E. in Power Eng. & Eng. Thermophysics from Beijing Institute of Technology in 2020, and continued to study for a Ph.D here under the supervision of Prof. Keliang Wang and Pucheng Pei. Now, his research interests include the anode/cathode/electrolyte design of metal-air batteries and PEMFCs.