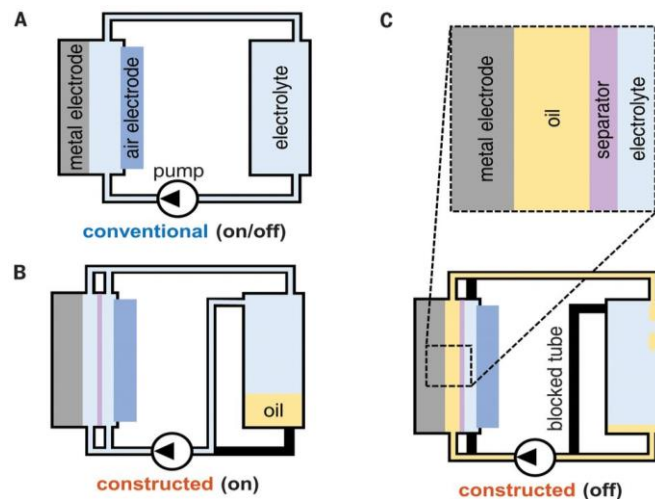


A Development of Corrosion Mitigation in Aluminum-air Batteries

Reporter: 劉超慧 Adviser: 鄭沐政老師 Date: 2019/05/27

Batteries can be quite heavy. However, a primary aluminum air battery overcomes this issue because its anode and cathode is lightweight and higher energy density. Despite this advantage, aluminum-air battery is not commercial mainly due to negative electrode corrosion irreversibly limits their shelf life. Many researchers devote to suppressing corrosion in aluminum-air battery, and two issues are considered: (a) the parasitic corrosion of aluminum at open-circuit potential and under discharge, due to the reduction of water on the anode and (b) the formation of aluminum hydroxide layer. Most corrosion mitigation methods been proposed are insufficient. Recently the authors, Brandon J. Hopkins*, Yang Shao-Horn and Douglas P. Hart, design a device suppressing open-circuit corrosion by displacing electrolyte from the electrode surface with a non-conducting oil during battery standby. They demonstrate this method is achieved 99.99% reduction in corrosion, which lowers self-discharge to a rate of 0.02% a month.



Main Reference :

1. Brandon J. Hopkins, Yang Shao-Horn, Douglas P. Hart. Suppressing corrosion in primary aluminum-air batteries via oil displacement. *Science*: Vol. **362**, Issue 6415, pp. 658-661 (2018). DOI: 10.1126/science.aat9149
2. D.R.Egan, C.Ponce de León, R.J.K.Woodb, *Journal of power sources* Vol. **236**, pp: 293-310 (2013) DOI: 10.1016/j.jpowsour.2013.01.141
3. Y. Li, J. Lu, Metal-air batteries: Will they be the future electrochemical energy storage device of choice? *ACS Energy Lett.* Vol.**2**, 1370-1377 (2017). DOI:10.1021/acsenerylett.7b00119