

Pseudo-concentrated Electrolyte Enables High Performance Lithium Metal batteries

Nan Piao^a, Li Wang^a, Xiangming He^a

^a *Institute of Nuclear and New Energy Technology, Tsinghua University, Beijing 100084, China*

E-mail: piaonan123@126.com

Lithium (Li) metal is an ideal material as the anode of rechargeable Li batteries, due to its high theoretical specific capacity (3860 mAh/g) and low negative potential (-3.040 V vs. standard hydrogen electrode)[1]. However, dendritic Li growth and limited coulombic efficiency (CE) during repeated Li deposition/stripping processes are still difficult issues restricting the application of lithium anode. Extensive attempts have been made to prevent lithium-dendrite growth, such as changing the composition of electrolyte, introducing artificial solid electrolyte interphase and lithium-deposition hosts. Recently, concentrated electrolytes were proposed to enable a high performance of lithium anode [2]. In this work, the pseudo-concentrated electrolyte, which is made by diluting the high concentrated electrolyte (10MLiFSI-DMC) with 1,1,2,2-tetrafluoroethyl-2,2,3,3 tetrafluoropropylether (TFT) were studied. In this new system, capacity retention of high concentrated electrolyte (10MLiFSI-DMC) and pseudo-concentrated electrolytes, the capacity retention can even be maintained at a high level after 200 cycles in Li|Cu cells, which is higher than pure high concentrated electrolyte and the LiPF₆-based electrolyte. These results show that the pseudo-concentrated electrolytes exhibit superior electrochemical performance and would be a promising candidate for application in rechargeable Li batteries. The pseudo-concentrated electrolytes have a comprehensive merit of high conductivity, low viscosity, low cost and further suppressed the lithium dendrite, which show a promising application in lithium metal batteries.

References:

- [1] Zhamu A, Chen G, Liu C. *Energy & Environmental Science*. 5(2012) 5701-5707.
- [2] Fan X, Chen L, Ji X. *Chem* 4 (2018) 174-185.