

# Novel Solvation Ionic Liquid Based Electrolyte for Ni-Rich NCM Batteries

Lan Zhang<sup>a</sup>, Yawei Guo, Xiaoyan Zhang, Suojiang Zhang<sup>a, b</sup>

<sup>a</sup> Institute of Process Engineering, Chinese Academy of Sciences, Beijing 100190, PR China

<sup>b</sup> School of Chemical Engineering, University of Chinese Academy of Science, Beijing 100049, PR China

E-mail: zhangl@ipe.ac.cn

Ni rich NCM such as NCM622 or NCM811 are regarded as the most promising cathode material for high energy power batteries due to their outstanding properties such as high specific capacity, tap density, as well as high operate potential. While higher potential often lead to severe interfacial reactions between electrode and electrolyte solvent which causes gassing and capacity decay. Therefore, electrolyte is becoming the bottle neck in high energy power battery developing.

Ionic liquids are considered as ideal material for their high electrochemical stability, low volatility, as well as wide liquid temperature range, while they are rarely been used in commercial LIBs for the incompatibility with graphite anode and slow kinetics. The concept of solvation ionic liquid (SIL) is first proposed by Watanabe's group<sup>[1]</sup>, then they used this special IL in lithium ion and lithium sulfur batteries<sup>[2-4]</sup> and proved their compatibility with various electrode materials.

Herein this paper we report a  $[\text{LiG4}]^+[\text{TFSI}]^-$  SIL based electrolyte whose electrochemical stable potential is up to 4.6V, solvent with low dielectric constant was introduced to reduce the viscosity and enhance the conductivity, on which it could be used in Ni-rich NCM materials even for high rate applications. Meantime, little HF could be produced even in high temperature operation as no  $\text{LiPF}_6$  was adopted, hence the possibility of transition metal dissolution is largely reduced, and on which cycle stability of Ni-rich NCM was greatly enhanced.

## References:

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