MTE PhD Oral Review

“Electronically Conductive Phospho-Olivines As Lithium Storage Electrodes”

With the development of mobile devices and electric cars, the demand of lithium-ion batteries (LIBs) keeps increasing. In 2014, LIBs account for 33.4% of the rechargeable battery market although lead acid batteries have the latest market share (~64.5%). Because of the decreasing cost and increasing efficiency of LIBs, the rechargeable battery market will remodel itself dramatically. Estimate by Bernatein, LIBs will occupy 70% of the rechargeable battery market by 2025. Lithium Iron Phosphate (LiFePO4) attracts lots of attention because of its low price, good electrochemical performances and environmental friendliness. However, low electronic conductivity limits its wide usage. In this study, they doped LiFePO4 with metals that are supervalent to Li ion and increased the electronic conductivity by a factor of 10^8. In addition to that, the capacity of 6000mA/g is attained, which will help the power density significantly in conventional cells. It is anticipated this is a starting point for more applications of doping in cathode materials, following by more development and usage of lithium-ion batteries in daily life.