TUNABLE CARBON COATING OF $NaTi_2(PO_4)_3$ FOR IMPROVED BATTERY PERFORMANCE

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NASICON-type $NaTi_2(PO_4)_3$ (NTP) is the most thoroughly investigated aqueous Na-ion battery negative electrode material due to its high theoretical capacity, remarkable thermal stability and environmental benignity. Despite being highly ionically conductive, the material suffers from inherently low electron conductivity [1]. Additionally, poor cycling stability is observed owing to the dissolution of inorganic active material into water-based electrolyte [2]. Traditional particle coating by graphitization of glucose or citric acid (CA) does not guarantee an even conductive carbon layer. Growing a precisely-controlled polymer e.g. polydopamine (PDA) shell on the particles prior to the pyrolization is a sensible way to both enhance stability and conductivity of active material [3].

The aim of this investigation was to reveal the effect of in-situ polymerization conditions on the NTP electrochemical properties. A polydopamine shell is grown on the particles synthesized by a co-precipitation route with varying parameters such as initial pH and monomer concentration. The electrochemical performance of electrodes is investigated by galvanostatic charge/discharge cycling. The results suggest that polydopamine coating results in enhanced electrode capacity compared to conventional routes (Fig. 1).

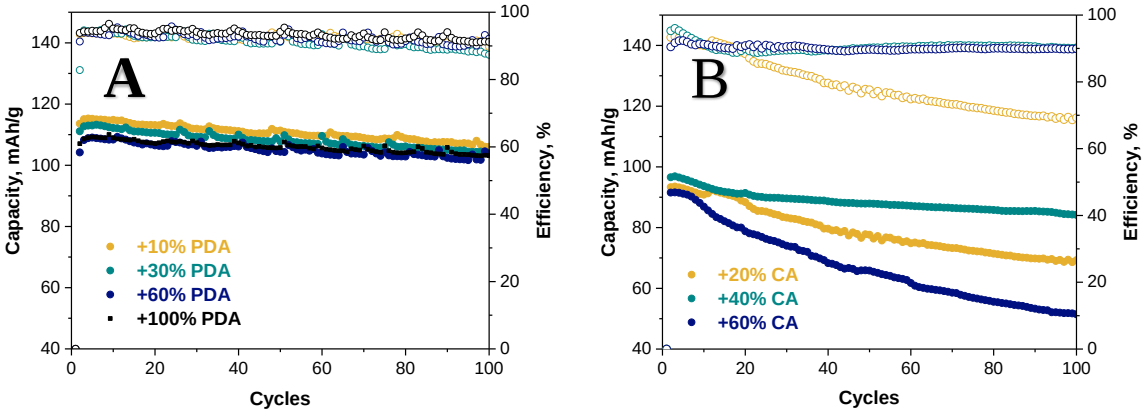

Fig. 1. Discharge capacities and charge/discharge efficiencies of electrodes prepared with a) PDA as a carbon precursor; b) CA as a carbon precursor.

References:

1. Xu et al. *Nano energy* **28** p. 224-231 (2016)
2. Plečkaitytė et al. *Journal of Materials Chemistry A* **9** p. 12670-12683
3. **Chi et al. *RSC Advances* 4** p. 7795-7798 (2014)