Colloidal synthesis of Ultrathin and High Performance Lithium Iron Phosphate Nanoplatelets

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Olivine Lithium iron phosphate is an interesting material for energy storage. For its high theoretical capacity (170 mAh g^{-1}), high stability and layered structure Lithium Iron Phosphate has caught the interest of the chemists as cathode material for secondary lithium ion batteries. After Goodenough's synthesis[1] Lithium iron phosphate could be also synthesized through an hydrothermal synthesis[2-3], solvothermal synthesis[4], pyrolisis[5], microemulsion[6], sol-gel synthesis[7-8]. A colloidal route was presented by Jiang et al.[9]. Here we present a new synthetic route that yields ultrathin LFP nanoplatelets with a thickness of 5-7 nm and a length of 60 – 70 nm [*Fig.1*]. We can control the size and the shape of the crystals using different surfactants and different precursors. Respect to the bulk material lithium iron phosphate nanoplatelets show very facile intercalation and de-intercalation in the tryphilite structure.
This procedure was recently patented:

http://www.iit.it/en/technology-transfer/patents/smart-materials-patents/item/shape-control-synthesis-of-lithium-iron-phosphate-nanocrystals-via-colloidal-synthesis.html?category_id=8

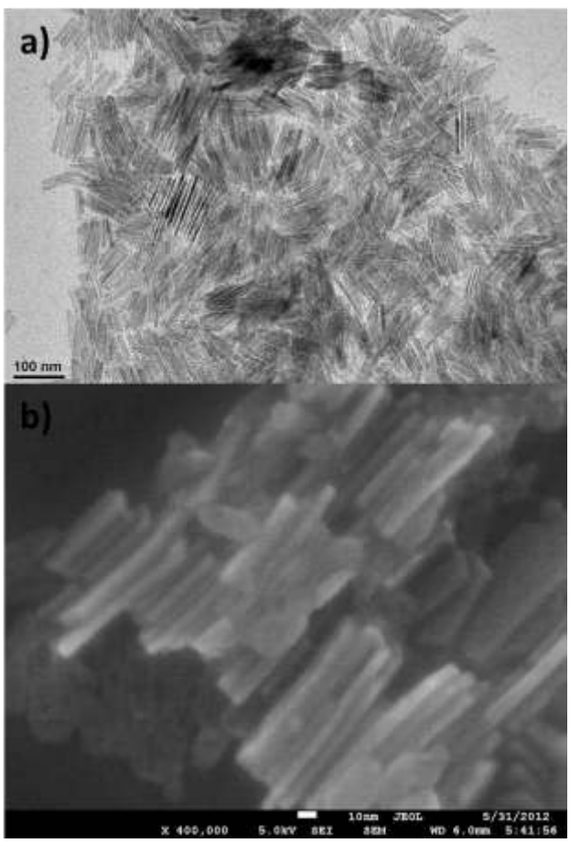

Figure 1: a) TEM image on LFP nanoplatelets, b) SEM image of LFP nanoplatelets

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