# On the lithium insertion/extraction process $LiFePO_4$.

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Olivine-$LiFePO_4$ has since its discovery by Prof. John B. Goodenough [1,2] attracted much attention as a cathode material for lithium-ion batteries. This attention has been due to the fact that the material is made from inherently cheap starting materials, is environmentally benign and has a remarkable stability/safety even under abuse conditions.

Some features which makes $LiFePO_4$ less attractive for lithium ion batteries include one dimensional lithium transport paths making it comparatively sensitive to crystal defects, a potential limited to ~ 3.4V vs. $Li/Li^+$ and poor electronic conductivity. Importantly, the lack of electronic conduction can be countered by carbon coating the particles.[3] Interestingly, the delithiation process takes place *via* a two phase mechanism, which is responsible of the pinned electrochemical potential during the charge storage and retrieval processes.

In this talk we will present our most recent developments on characterizing the lithium insertion/extraction process. This will include our electrochemical technique that allow for the determination of capacity in both carbon coated *and* coating free $LiFePO_4$. This is important, as coincell tests do not permit reliable capacity determination of coating free $LiFePO_4$. We will further touch upon our recent developments of alternatives to carbon coating, which can be used to make functional electrodes at low temperature.

## References

[1] A.K. Padhi, K.S. Nanjundaswamy, and J.B. Goodenough, *J. Electrochem. Soc.* **144**, 1188 (1997).
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