

Title: Chemical modification of LiFePO₄
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Abstract Summary:

Lithium iron phosphate, LiFePO₄, with olivine structure has become of great interest as a cathode for the next generation lithium-ion batteries, particularly for hybrid electric vehicle applications, because of its high energy density, low cost, safety and environmental compatibility. The Li⁺ ion can be extracted/inserted from/into LiFePO₄ at the electrode potential of 3.5 V versus Li/Li⁺, and the theoretical discharge capacity is 170 mA.h.g⁻¹. On the other hand, the major drawback of LiFePO₄ is the decrease of capacity with increasing charge/discharge current density, associated with its fundamentally low electronic and ionic conductivity. An attempt to overcome this problem involved the deposition of conductive carbon coating.

About two decades ago, the electrochemical modification of carbon electrode by the diazonium chemistry has been reported. The reduction of aryl diazonium salts at the surface of a carbon electrode generates radicals at the solution-electrode interface that eventually form a covalent carbon-carbon bond with the surface. Hence, a variety of organics functions could be grafted on the surface simply by changing the substituent of the aryl diazonium salt. It should be noted that in addition to the electrochemical approach, the spontaneous modification of carbons, without any electrochemical assistance, has been also reported.

Thus, this chemical grafting method was used to modify the surface and electrochemical properties of LiFePO₄/C powder. This method allows the attachment of various substituted aryl groups with a strongly C-C bond in order to change the surface properties. The reduction of in situ generated diazonium cations in organic media leads to the functionalization of the carbon coating of LiFePO₄/C.

This presentation will focus on the description of the diazonium chemistry for the surface modification of LiFePO₄/C cathode for Li-ion batteries.

Chemical modification of LiFePO₄

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