

Modified Carbon as Additive for High Potential Li-Ion Cathode

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The functionalization of acetylene black carbon with hydrophobic (eg. $-\text{C}_6\text{H}_4\text{CF}_3$) and hydrophilic (eg. $-\text{C}_6\text{H}_4\text{SO}_3\text{H}$) groups was performed via the diazonium chemistry. Elemental analysis and X-ray photoelectron spectroscopy confirmed the attachment of the different substituted aryl groups at the surface of the carbon. The electrochemical performance of functionalized and unmodified carbon electrodes was investigated by cyclic voltammetry and galvanostatic cycling. The irreversible electrolyte degradation observed between 4.5 and 5.3 V vs. Li/Li⁺ was strongly diminished after modification. The different functionalized carbons were then utilized as conductive additives with high cathode material in half-cell. Improved capacity retention and higher discharge capacity were obtained for cathodes made with modified carbons.