

**Metal-Metalloid Alloys as Alternatives to the
Use of Carbons as Negative Electrodes in
Lithium Cells**

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Lithium-carbons are currently employed as negative electrode reactants in lithium systems. Possible improvements might involve the ability to operate safely at higher current densities, less first cycle irreversible capacity loss, better cycling behavior, reduced specific volume, and lower cost.

The surprise announcement by Fujifilm has led to a lot of interest in the use of convertible oxide materials. Other convertible precursors are now also being considered for this purpose, including metal alloys and semiconductors. One of the problems with metal-metal alloys is decrepitation due to large volume changes, which results in capacity loss upon cycling. A recent model explains the mechanism of this phenomenon and the observation of a critical particle size.

Metal-metalloid alloys are also being investigated, including nitrides, borides, and silicides. In some cases their relatively light weight means that it is not necessary that they react with large amounts of lithium to achieve attractive specific capacities. This leads to less mechanical distortion, and potentially to better behavior upon cycling. Recent experimental results on a number of nitrides, borides and silicides will be presented.