Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Graphitic electrodes modified with boron and nitrogen for electrochemical energy storage enhancement[1] GUOPING XIONG, RAJIB PAUL, RON REIFENBERGER, TIMOTHY FISHER, Purdue University — Electrodes based on carbon nanomaterials (carbon nanotubes or graphitic nanopetals) have been modified with boron (B) and nitrogen (N) through a facile microwave heating cycle. During the microwave heating, the electrodes are immersed in a precursor solution consisting of urea and boric acid dissolved in either water or methanol. After microwave heating and overnight vacuum drying, the electrodes are again heated in nitrogen to remove unreacted chemicals and to form C_xBN. Hydrogen plasma was then used to remove any residual boron oxide from the surface of the electrodes. Carbon nanotubes modified with B and N exhibited higher lithium storage capacity as compared to pure carbon nanotube electrodes. We note that the modification appears to produce a highly unexpected and substantial cycle-to-cycle improvement in battery capacity as the electrode cycles through hundreds of charge-discharge iterations. This process can be applied to other carbon-based electrodes, which themselves are recognized for their high performance, to add further improvements.

[1]AFOSR MURI No. 105800

Ron Reifenberger
Purdue University

Date submitted: 09 Nov 2012 Electronic form version 1.4