Fabrication of Porous Carbon Material for Li-ion Battery

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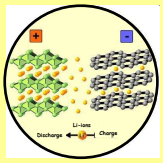


Schematic Presentation of Lithium-ion Battery

INTRODUCTION

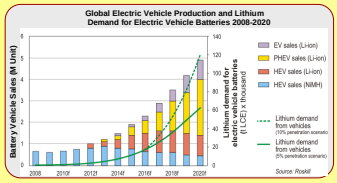
A lithium-ion battery (sometimes Li-ion battery or LIB) is a family of rechargeable batteries in which lithium ions move from the negative electrode to the positive electrode during discharge, and back when charging, as shown in schematic diagrame.

Challenges: To improve the power density, recharge cycle, safety and reduce the cost.

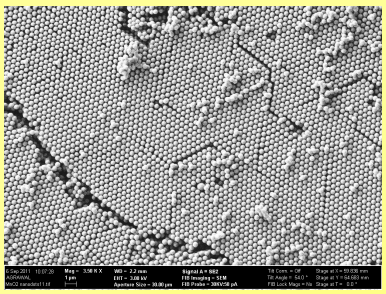
Motivation of Study: Fabrication of highly porous Carbon-Sulphur composite electrode materials for Li-sulphur Batteries.

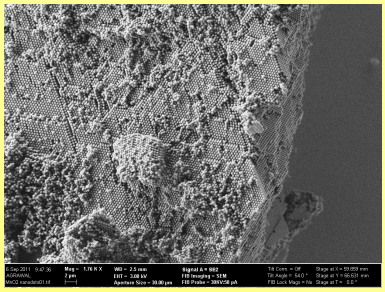
Approach: (a) Fabrication of Polymer templates (b) Filling the polymer templates with Carbon Precursor (c) Carbonization of resulting hybrid material (d) Hydrothermal treatment with Sulphur

Applications of Li-ion Batteries



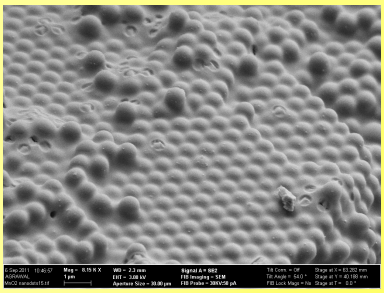
Resin derived Porous Carbon

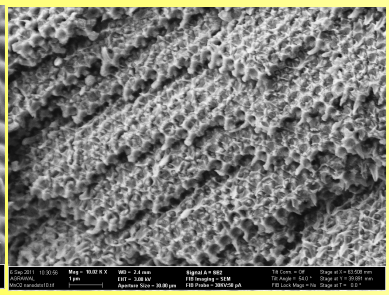




SEM images of Colloidal Crystals

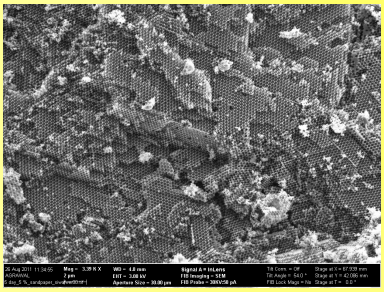
Resin Infiltration

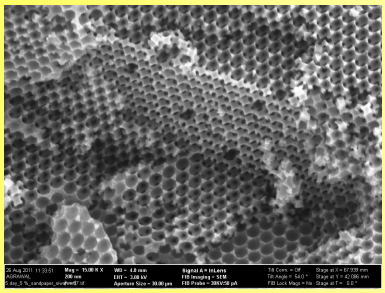




SEM images of Resin filled Colloidal Crystals

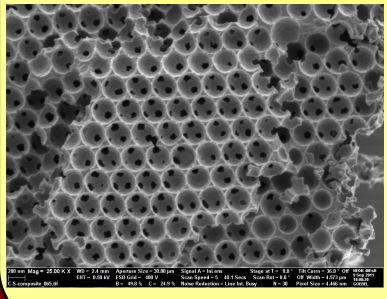
Carbonization

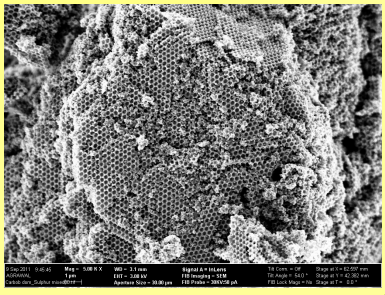




SEM images of Porous Carbon

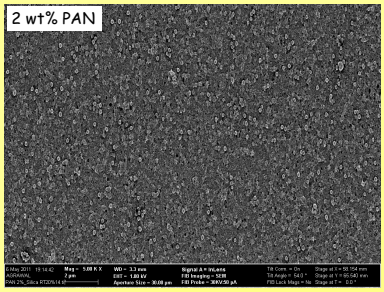
Sulphur Hybridization

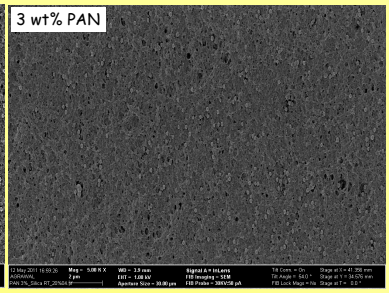




SEM images of Porous Carbon-Sulphur Composite

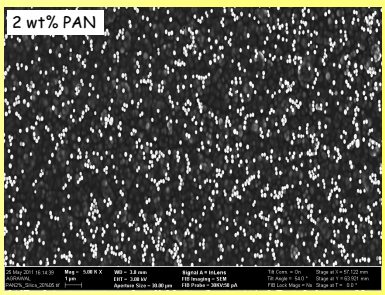
Poly(acrylonitrile) derived Porous Carbon

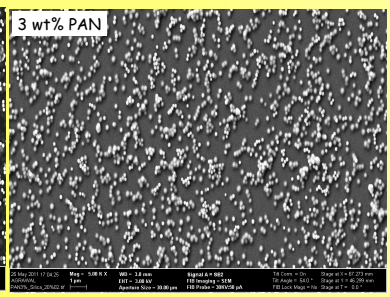




SEM images of PAN-SIlica Composite Films

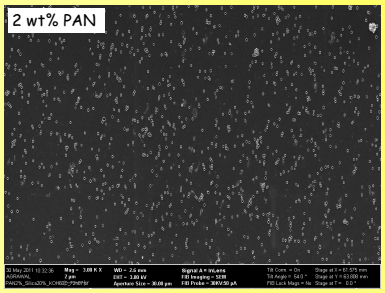
Carbonization

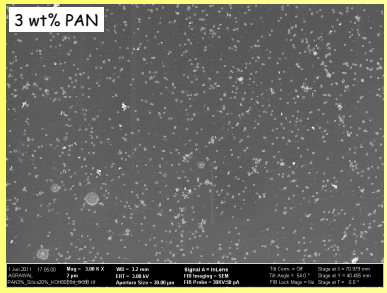




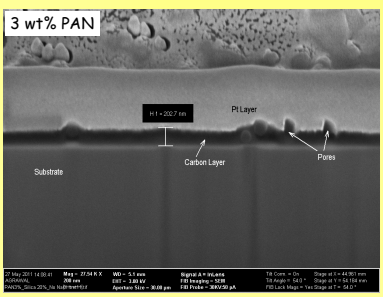
SEM images of Carbon-Silica Composite Film

HF Etching

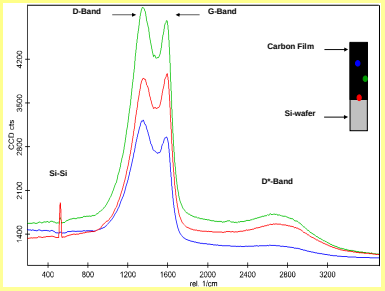




SEM images of Porous Carbon Film



SEM images of Porous Carbon Film (FIB cross section)



Raman Spectra of Porous Carbon Film

CONCLUSIONS AND OUTLOOK

1. Resin derived Carbon powder with high porosity has been fabricated and mixed with Sulphur.
2. Poly(acrylonitrile) derived porous carbon films have been prepared on underlined substrates and Characterized
3. Performance of fabricated materials as Li-ion battery electrode and their further characterization are in progress.

Acknowledgements

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