Abstract Submitted
for the TSF16 Meeting of
The American Physical Society

Polymer-assisted deposition epitaxial Li(Ni,Co,Mn)O2 thin films[1]

DI HUANG, New Mexico State University, QI ZHOU, Las Cruces High School, RANDA KASSIS, BRIAN PATTERSON, HONGMEI LUO, New Mexico State University, HONGMEI LUO TEAM — Rechargeable lithium-ion batteries are widely used in mobile devices, hybrid, plug-in hybrid, and electric vehicles. The performance of batteries strongly depends on the structure, morphology, and properties of electrode materials. A great effort has been made to synthesize a variety of electrode materials and to understand the role of the electronic structure of redox active materials to improve the energy density, rate capability, and cycling stability. It is generally considered that positive electrode determines the specific capacity and the energy density of batteries. Li(Ni,Co,Mn)O_2, a layered material, has gained considerable attention as the positive electrode due to its high specific capacity and thermal stability. To understand the nature of the electrochemical reaction, it is expected that single crystal-like electrode materials may offer better understanding of its effects on crystallographic orientation on the electrochemical properties. To this end, epitaxial Li(Ni,Co,Mn)O_2 thin films of different orientations have been successfully grown on $SrTiO_3$ substrates from a solution method, called polymer-assisted deposition. The films have been characterized by x-ray diffraction, atomic force microscope, and cross-section high resolution transmission electron microscope.

[1]The work is support by Argonne National Laboratory.

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Date submitted: 22 Sep 2016 Electronic form version 1.4