International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

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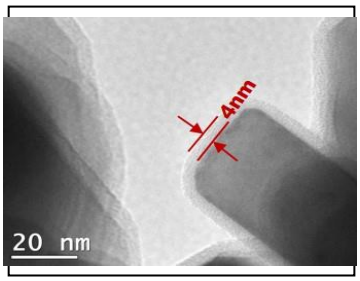
In-situ carbon coating tecnique for layered oxide cathde materials for Lithium ion battery

Overview

Uniform carbon coating on electrode materials for lithium ion battereis is an effective method to increase the cyclic stability of lithium ion cells. By a novel in situ technique of solid state reaction of carbon precursor pillared metal hydroxides having uniform carbon coating on oxide electrodes such as $LiNi_{1-x-y}Co_xMn_yO_2$, $LiMn_{2-x}N_{1-x}O_4$, $LiNi_{1-x-y}Co_xAl_yO_2$, $NaNi_{1-x-y}Co_xMn_yO_2$, Li_2MnO_3: $LiNi_{1-x-y}Co_xMn_yO_2$ has been achieved. A improved cyclic stability of the uniform carbon coated cathode materials compared to that of bare materials for lithium ion battereis is demonstrated.

Key Features

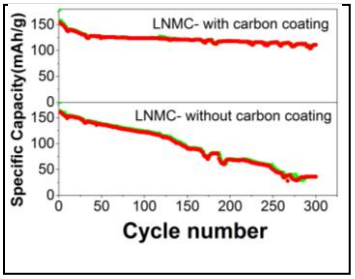
- Air ambient synthesis
- Insitu single step uniform carbon caoting
- Scalable manufacturing process
- Easily extendable to all oxide active material for Li/Na ion battereis



TEM micrograph depicting uniform carbon coating on $LiNi_{1-x-y}Co_xMn_yO_2$

Potential Applications

- Lithium ion battereis
- Sodium ion batteries



Intellectual Property Development Indices (IPDI)

- Performance and stability are validated at laboratory scale
- Scale-up synthesis is underway

Comapritive Cyclic stability of carbon coated $LiNi_{1-x-y}Co_xMn_yO_2$ with respect to the uncoated $LiNi_{1-x-y}Co_xMn_yO_2$

Status	1	2	3	4	5	6	7	8	9	10

Major Publications

A process for in-situ carbon coating on alkali transition metal oxide, M. B. Sahana, S. Vasu, M. Sathiya, and R. Gopalan, Patent Application No. 201611007461, Date of filing: March 03, 2016.

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