$LiNi_{0.33}Mn_{0.33}Co_{0.33}O_2$ (NMC) nanoparticles synthesis and implementation of the Li-ion battery electrode by using printing process

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Objectives

- ✓ Synthesis of nanoparticles of lamellar active material NMC
- ✓ Improve the electrochemical performances of the Li-ion battery
- ✓ Promote low-cost, high-resolution and high-throughput deposition and patterning process for the battery electrode manufacturing

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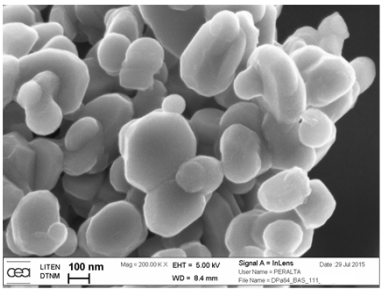
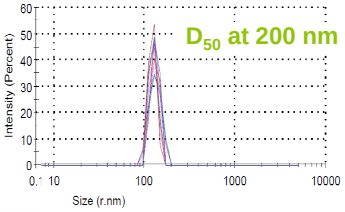
Synthesis of the nano-sized NMC

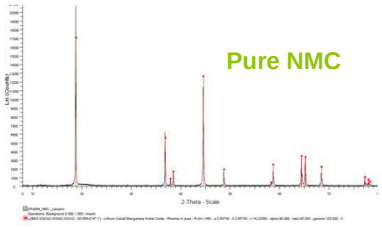
Nanoparticles of NMC synthesized by co-precipitation reaction leading to pure nanomaterial with narrow particle size distribution



SEM picture of NMC nanoparticles



Particle size distribution of NMC nanoparticles measured by DSL

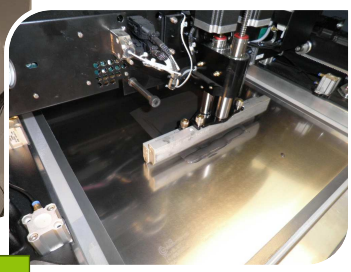


XRD spectrum of NMC nanoparticles

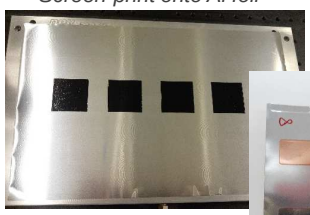
Electrode formulation and implementation

- ✓ Water-based slurry formulated from CMC binder and JSR TRD202A latex
- ✓ Electrode implemented by using screen-printing process (lab-scale)

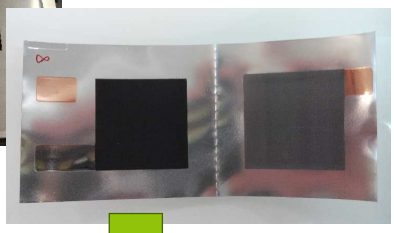
S2S screen-printer



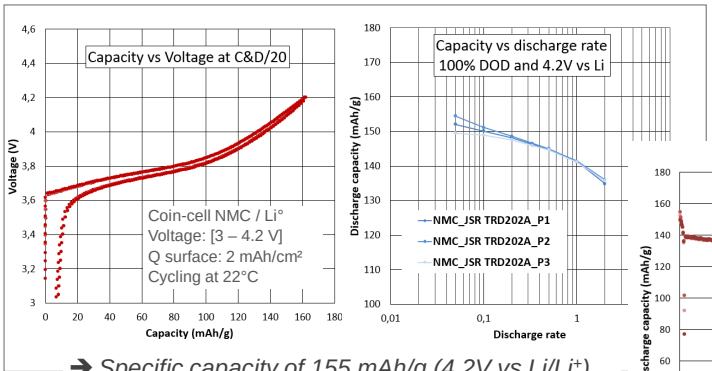
Screen-print onto Al foil

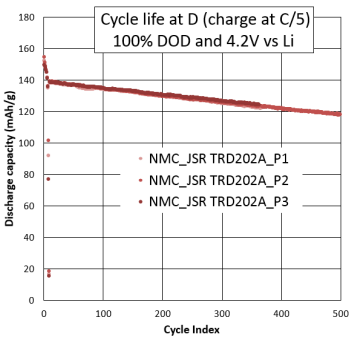


Screen print onto Varta current collector (hot embossed Cu and Al onto the battery pouch film)

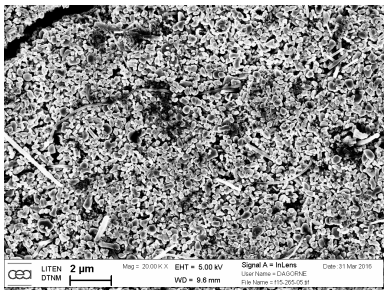


Electrochemical performances of the water-based nano-NMC electrode





- ➔ *Specific capacity of 155 mAh/g (4.2V vs Li/Li⁺)*
- ➔ *Good behavior at different discharge rates*
- ➔ *Capacity loss of 14% after 500 cycles*



SEM picture of the NMC electrode

- ➔ *Homogeneous structure*

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Partners involved in the project:

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