Direct Electroplating of Active Materials for Batteries: No Binder, No Carbon, No Slurry Processing

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Electroplating method has been utilized to obtain anode active materials for next generation lithium ion batteries (LIBs). Both cathode and anode active materials can be directly obtained via electroplating avoiding the energy and time consuming steps i.e. powder synthesis, slurry preparation, electrode production. Skipping these steps can revolutionize battery industry and create a large profit.

In order for electroplating to be continues relatively speaking a good electrical conducting materials need to be considered. For this, in this talk we aim to discuss the direct electroplating for the following materials: i-) LiCoO2 cathode active material, ii-) Tin anode active material iii-) Silicon anode active materials. For the latter, the Si is not a good electrical conductor so we also will focus on how to overcome loading limitation on these materials. Both aqueous and non-aqueous based electroplating methods will be elaborated during the talk and will give a holistic picture of where our researches are centered.

The talk will also dive in to how electroplating can bring different approaches for decreasing the cost of precursor of the active materials by allowing low purity precursor utilization. Current state of the art cathode producers have to use up to 99.9% purity Lithium, Cobalt and Nickel precursors regardless of precursor types such as hydroxides, nitrates or carbonates. Here with our approach we showed that we can achieve high purity cathode active materials, i.e. LCO, with utilizing super low purity of LiOH and $CoOH_2$ allowing a significant cost reduction.

References

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Dr. Ateş obtained his Ph.D. in 2015 from Northeastern University, Boston, MA. In late 2015 he joined a mature start-up company located in University of Illinois at Urbana-Champaign. In 2020, he returned to Türkiye with the prestigious award by TÜBİTAK 2232 Programme. He is an Assistant Professor at the Department of Chemistry at Boğaziçi University. He is also Member of the Board of Directors at Aspilsan Energy and Principle Investigator at Energy Storage Division at TÜBİTAK-RUTE. His research interest covers both cathode and anode active materials used in lithium-ion and sodium-ion batteries along with inactive components such as creating 3D metallic scaffolds for enabling high power batteries.

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