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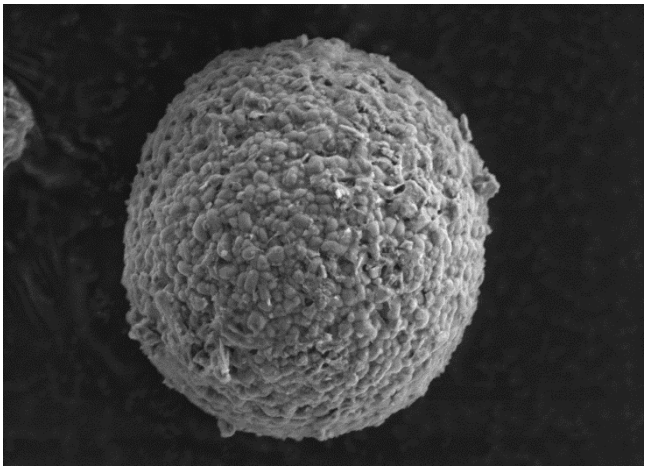
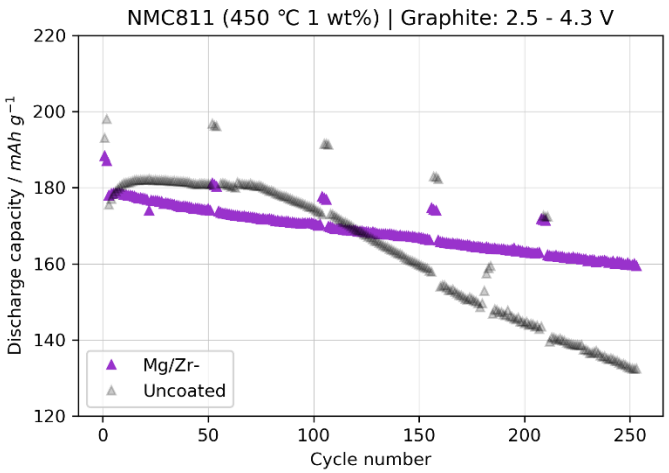
/ Where ideas thrive

Enhanced NMC-811 stability by scalable bimetallic coating

Single-source precursors for multiple-function coatings

Case Ref: Gre-7694-20





The problem – degradation of NMC-811 cathodes is a major cause of capacity fade in modern Li-ion cells, and is therefore a bottleneck in the adoption of these high-capacity batteries**.** Coating of particles is intended to slow degradation by limiting electrolyte-active material contact – however, techniques to achieve this at scale are hindered by damaging reaction conditions and inflexibility of element choice.

The solution – scalable bimetallic coating of NMC particles using single-source precursors.

Researchers at the University of Cambridge have combined their extensive expertise in inorganic synthesis and battery chemistry to develop a scalable route to coating NMC particles. Thin, mixed-oxide coatings with excellent elemental homogeneity can now be achieved using single source precursors - a convenient route avoiding high temperatures and aqueous conditions. These form protective barriers surrounding the active material and may stimulate performance improvement via doping. Mixed oxides enable tuning of ion transport and electrolyte barrier properties compared to monometallic equivalents, making these coatings truly multi-functional.

Professor Clare Grey FRS leads a world-renowned research team developing and applying advanced analytical techniques to understand electrochemical energy storage devices.

Professor Dominic Wright leads internationally-respected research into new synthetic routes to a broad range of main group and transition metal compounds.

Development stage and scope

Excellent cycling stability without loss of capacity compared to uncoated particles has been demonstrated for NMC-811 coated with Mg/Zr mixed oxide. The method is being expanded to a broad range of metals to realise its true potential. It is an exciting opportunity for those wishing to stabilise high Ni content cathode materials at scale.

Commercialisation

This technology is protected by a priority patent application (GB 2112283.3). We are now seeking to work with an industrial partner to optimise and scale the synthetic route and exploit its potential in high capacity, long lifetime Li-ion batteries.

This technology offers a real competitive advantage through improved cell lifetime without harsh conditions, alongside a platform for further optimisation.

Benefits

- **Improved NMC lifetime** without compromising capacity
- **Convenient and gentle** preparation method
- Platform to **optimise metal content** of coating

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