Poster

Synthesis of iron- and lithium- based oxalate compounds for use as cathode materials

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Lithium-ion batteries (LIBs) have become essential in today's world and are seen as a potential strategy to lower CO_2 emissions [1]. Layered lithium metal oxides, such as lithium cobalt oxide (LCO) and lithium nickel manganese cobalt oxide (NMC), have been a popular choice of cathode due to their high energy density and good performance [2]. However, they contain elements with low abundance such as cobalt therefore a logical step is to explore cathodes that use abundant metals such as iron. Currently lithium iron phosphate (LFP) is the most popular iron-based cathode, however it has limitations with slow lithium-ion diffusion due to the structure containing one-dimensional channels instead of layers found in LCO [3]. Lithium iron oxide forms over ten polymorphs with most being electrochemically inactive so gaining better control of polymorph formation could allow for the synthesis of an electrochemically active material.

We have synthesised several precursor materials containing lithium, iron, and oxalate. The iron and lithium are present in different layers providing 2D layers for lithium-ion diffusion. These materials have been calcined to try and template the formation of electrochemically active polymorphs of lithium iron oxide.

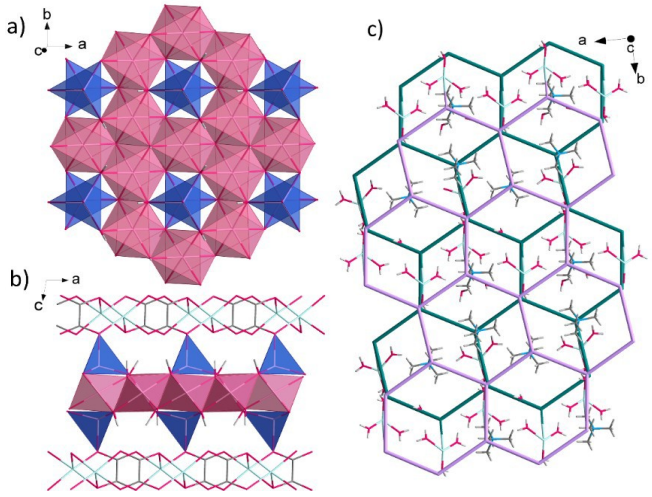

Figure 1. a) and b) layered transition metal and lithium compound with the transition metal coordination sphere represented by polyhedra, c) simplified representation of layered transition metal and lithium compound with lithium and organic counterions between sheets.

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