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### Summary ECO COM'BAT

The objective of the EIT RawMaterials project ECO COM'BAT was to combine resource-efficient and high-performance materials and to scale up their production for the next generation of high-voltage lithium-ion batteries. ECO COM'BAT was



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## ECOLOGICAL COMPOSITES FOR HIGH-EFFICIENT LI-ION BATTERIES

coordinated by Fraunhofer ISC and carried out in the period from April 2016 to December 2018. In conjunction with the materials producers Arkema and Umicore, the cell manufacturers SAFT and Custom-cells, the RTOs Fraunhofer, CEA, CSIC, ENEA and VITO as well as the Technical University Darmstadt, the project participants covered all edges of the knowledge triangle along the battery value chain.

One main focus was on the substitution of cobalt in the electrodes and of fluorine in the electrolyte. For this purpose, the production of an ORMOCER® coated NMC 622 and the lithium salt LiFSI was scaled up to batch sizes of approx. 10 – 20 kg. In addition, the structured carbon additives Porocarb® and Graphistrength® were applied to further increase the energy and power density. The sustainable materials were integrated in pouch cells on a pilot level, which showed an improved performance in comparison to cells with industrial reference samples.

For the optimization of the ECO COM'BAT materials and cells, a comprehensive simulation of the battery performance and aging was performed. Moreover, an efficient recycling concept was developed and tested to achieve a high degree of sustainability. In order to promote the commercial exploitation of the project results, a business plan was created, including possible joint products such as the combination of Porocarb® and Graphistrength®.

Project starting date: April 1st, 2016

Project duration: 2.75 years

Project type: Upscaling

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