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BATTERIES : from design to recycling

Overview and challenges

The rapid emergence of electric vehicles is driving an explosion in the demand for batteries, which is set to increase ten-fold by 2030.
The first challenge associated with batteries concerns **their constituent materials**, namely metals, some of which (lithium, manganese, cobalt, nickel, copper) - rare and expensive, and difficult to extract and refine - are critical and strategic, raising issues in terms of sovereignty, supply and recycling.
The second challenge concerns **the battery components** made from these metals and other substances such as polymers. These are highly specialized products demanding careful management of their formulation and production chain.

Thirdly, multiple challenges arise relating to **the expected characteristics of batteries**, of which there are many: **durability, energy efficiency, autonomy, charging time, reliability, operating safety and cost control**. The most expensive component of a battery is the cathode, which accounts for around 40% of its total value.

In this context, IFPEN's teams are working to improve **the material manufacturing processes** for existing and emerging technologies (solid electrolytes, lithium-sulfur batteries, etc.). They are supported by teams specializing in the numerous scientific and technical fields involved, and have access to experimental resources to characterize these batteries and conduct various types of tests (**aging, thermal runaway**, etc.). Long-standing expertise in battery simulation and modeling, combined with characterization, makes it possible to predict battery behavior and guide their design.

Our solutions Our networks Our strengths

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