

Battery performance

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Short bio

Thierry PRIEM, Storage and Flexibility Solution Program Manager at CEA, has an engineering degree from the elite French “Ecole Polytechnique” and “Ecole Nationale Supérieure des Mines de Paris”.

He also has a PhD in solid-state physics. Thierry Priem has a broad technical and scientific background at CEA (French Alternative Energies and Atomic Energy Commission) in different research fields: material science, new energies, etc. Thierry Priem teaches in several engineering schools and is regularly involved in national and European expert missions.

For 4 years, Thierry Priem has been at the head of a service of 60 people involved in new energies (hydrogen and fuel cells, photovoltaics, etc.). He has also an experience in technology transfer and negotiation with industrial partners. Mid-2007, he has been the Hydrogen & Fuel Cell Program Manager within the Direction of the New Technologies for Energy at CEA in Grenoble. In 2014, he joined the Scientific Direction at CEA/LITEN. Since 2020, he is Storage and Flexibility Solution Program Manager at CEA. He was also member of the Board of the FCH-JU2 Research Grouping “Hydrogen Europe Research”.

Abstract

Today, the lithium battery developments are driven by the electric mobility deployment, especially for light duty vehicles. The main challenges of new battery generations lie in improving performance (energy and power densities), durability (cyclability) and reducing critical raw materials. To this purpose, international roadmaps define several future generations of lithium batteries:

- Gen3b as incremental evolution of the present generation with a significant reduction of cobalt with equivalent performance and durability,
- Gen4 “solid state” batteries, as disruptive solution with a solid electrolyte instead of the traditional liquid one in order to increase significantly energy density and safety,
- Gen5 for the next decades with batteries such as Lithium-Sulfur or Lithium-Air.

Like land mobility, the aviation sector must decarbonise. Several solutions are investigated:

- Sustainable Aviation Fuel (SAF) for long, mid and short range aircrafts
- Hydrogen for mid and short range aircrafts
- Batteries for short range aircrafts and drones

So batteries appears as a elastic solutions for aircraft electrification in national and European roadmaps for the next decades. Batteries would be used alone for small aircrafts or drones or hybridized with fuel cells for bigger aircrafts.

CEA is involved in next battery generation development from material to integrated systems as well as in battery recycling. Some examples of CEA battery developments for aeronautical applications will be given.