

# Towards safe and powerful solid-state batteries

*Solid-state batteries intend to bring the performance of conventional battery systems to the next level in terms of energy density, charging speed, weight and volume. However, due to manufacturability challenges, their adoption has not taken off so far. Addressing those challenges, SOLiTHOR proposes components enabling an assembly process that is more compatible with classical Li-ion batteries assembly lines, while it also improves battery performance. Its priority right now is to work towards establishing proof of concept at an industrial scale, as one of SOLiTHOR's founders, and Chief Technology Officer, Dr Fanny Bardé, explains.*



Dr. Bardé is a seasoned battery technology expert who has notably worked for Duracell and Toyota Motor Europe. In 2019 she joined the Solid-State Battery Programme at imec, the global research organisation which specialises in semiconductors and nano-engineering. “imec has been researching solid-state electrolyte nanomaterials since around 2010,” she points out. “But as it’s purely a research organisation, we felt the need to spin-out the programme and work towards commercialisation.”

Dr. Bardé teamed up with Huw Hampson-Jones to establish SOLiTHOR in 2022, and they have achieved a lot in their young existence. The company raised €10M in a seed investment round, and is preparing to move to a new research, cell testing and production facility in Sint-Truiden, Belgium. A staff of 25 now forms the backbone of SOLiTHOR’s move toward commercialisation of cell and module technology for the electrification of vehicles for the aviation, defence and maritime sectors.

Regional aviation in particular is keeping a close eye on developments at SOLiTHOR, says Dr. Bardé. “Conventional batteries have electrolytes in liquid form, and they’re flammable: the material isn’t intrinsically safe. The idea of solid-state

batteries is to have a solid electrolyte that is, in contrast, intrinsically safe and stable. This is of more interest to the aviation sector than to anyone else.”

While there are different types of solid electrolytes under development, SOLiTHOR is uniquely positioned as it addresses manufacturability challenges while at the same time improving performance, Dr. Bardé explains. “We start with a liquid precursor solution before it becomes solid. This means that a few steps from classical Li-ion batteries assembly can be replicated. Another major advantage is that most experts in the field believe that with solid-state batteries, you can change the anode. The anode commonly used in Li-ion batteries today is made of graphite or silicon/graphite which limits its performance. With solid-state batteries, it is possible to envisage for the first time the replacement of graphite with lithium metal while ensuring the safety of the battery, and simultaneously increase the performances of the cell. Lithium metal has the advantage to be the lowest voltage material that exists. Lower voltage means higher battery performance, and there are no safety issues as the electrolyte is solid.

Other key differentiators of the SOLiTHOR technology compared to other Solid-State

Electrolytes is the fact that no new rare earth element (such as Ge) is needed in the composition of the material. Moreover, you do you need a high temperature step to produce the solid electrolyte - bringing advantages both in term of geopolitical and environmental sustainability - two important aspects for the battery industry”

SOLiTHOR has a collaboration with Sonaca, a Belgian aircraft manufacturer, with the aim to integrate SOLiTHOR cells into Sonaca’s aircraft. First, however, the company needs to further increase the capacity of the pouch cells it is developing; it has already increased its test channel capacity 10-fold over the past year, and is looking to increase this even further at the new facility. Ultimately the company will need to demonstrate that it can ramp up production, meeting industrial requirements. Dr. Bardé anticipates that they will be ready to do this by the end of the decade.



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