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CHALLENGES IN THE DEVELOPMENT OF NEXT-GENERATION LITHIUM BATTERIES: THE NEW HIGH-ENERGY SEMI-SOLID LITHIUM/OXYGEN FLOW BATTERY

Practical case

Brilloni A. ^[1], Soavi F.^[2], De Giorgio F.^[1], Poli F.^[2]

^[1]Battery Srl ~ Bologna ~ Italy, ^[2]University of Bologna ~ Bologna ~ Italy

Abstract text:

The development of next-generation batteries will be fundamental for the widespread of electrochemical energy storage. This will boost the shift from a fossil-fuel-based economy to one based on renewable, as our society is globally asking nowadays. Among the new technologies, flow lithium batteries (FLBs) are attracting attention thanks to the combination in a unique solution of the high specific energy of lithium batteries and the flexibility of design of the redox flow batteries that, in turn, allow to decouple energy and power (Park et al., 2016). Different kinds of FLBs have been proposed, including batteries featuring semi-solid anodes (anolytes) and/or cathode (catholytes). Improvement in materials, cell design, and concepts are still mandatory to achieve a leap forward in the next battery generation (Hatzell, Boota and Gogotsi, 2015; Ventosa et al., 2015).

Battery Srl is an Italian Innovative Startup that aims to bring into the market a radically new battery concept, i.e. NEw Semi-Solid flow lithium OXYgen battery (NESSOX). This new concept combines the high energy density of Li/O₂ batteries with the flexibility and scalability of redox flow batteries. NESSOX features a lithium metal anode and a semi-solid, flowable catholyte, and displays the highest practical specific energy and energy density ever reported up to 500 mWh cm⁻², and current densities up to 4 mA cm⁻². Thanks to the flowable nature, a fast recharge by “catholyte refueling” is also enabled (Ruggeri, Arbizzani and Soavi, 2016, 2018; Poli, Ghadikolaei and Soavi, 2019).

This technology will change the scenario of electrochemical storage introducing on the market a radically new solution that will accelerate the shift to a low impact society. What is more, Battery Srl will contribute to the socio-economic growth of Italy and to the implementation of international energy policies through the introduction to market of innovative advanced battery components and systems. The main technology challenges faced by BETTERY to bring NESSOX into the market are here presented and discussed.

Owner:

Battery Srl

Geographical origin:

Italy, Emilia-Romagna, Bologna

References (Harvard style):

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