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Nanostructuring Strategies for Silicon-based Anodes in Lithium-ion Batteries: Tuning Areal Silicon Loading, SEI Formation/Irreversible Capacity Loss, Rate Capability Retention and Electrode Durability


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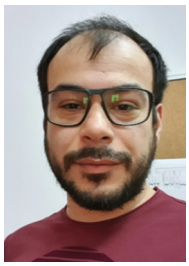

Mihai-Robert Zamfir


Costel-Sorin Cojocaru

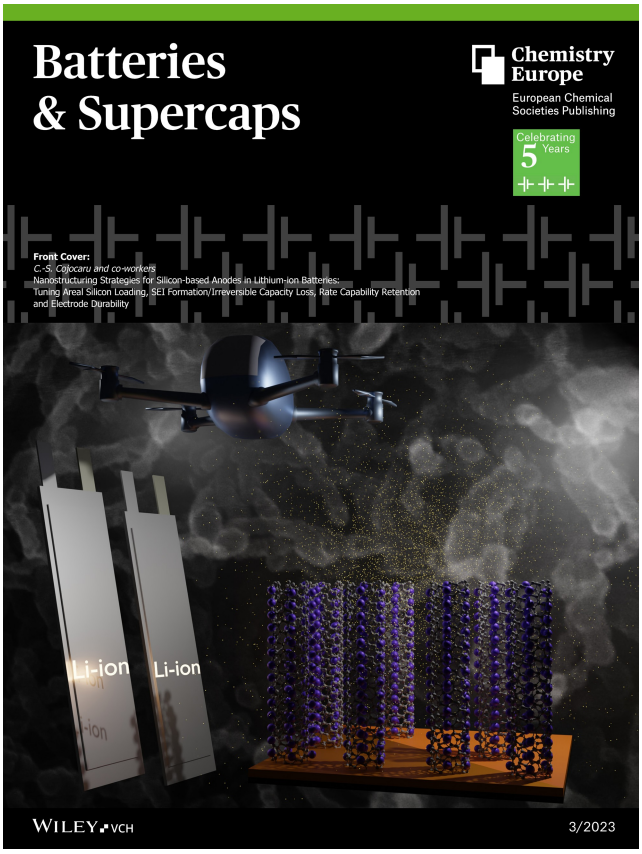
Invited for this month's cover picture is the group of Prof. Dr. Costel-Sorin Cojocaru. The cover picture illustrates the hierarchical hybrid nanostructured electrode composed of vertically aligned carbon nanotubes decorated with silicon nanoparticles as anode for next generation lithium-ion batteries. Read the full text of the Research Article at 10.1002/batt.202200451.

What is the most significant result of this study?

The hybrid nanostructured silicon-based electrode has shown an excellent stability with reversible capacity of 1330 mAh g^{-1} after 2000 cycles.

What are research activities of the team?

Eco-aware and Efficient Nano -MAterials, nano-DEvices and Engineering (NanoMADE-3E Initiative) research is mainly "intellectual curiosity/ phenomena understanding" driven. Since more then 20 years, the research has been a continuous quest for the understanding of the properties of new nanomaterials, and the control of their synthesis through the understanding of growth mechanisms. Furthermore, the insights provided by these fundamental studies are exploited for establishing new synthetic processes/ mechanisms and the respective technology assessment, (original nanomaterials functional assembly and underlying working mechanisms) when integrated in novel devices or advanced electronics, energy or environment-related applications. We rely on a more a "physical manufacturing process" than a classical "chemical" one. However, all the processes which are used are known and used for large scale production in industrial process (particularly in microelectronics and photovoltaics).



What other topics are you working on at the moment?

Other research topics include lithium-sulfur batteries, silicon-sulfur batteries and gas sensors.