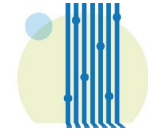




www.v2t-vacuum.org

29 & 30
MAY 2024
GRENOBLE



Vacuum-deposited solid-state thin-film batteries

Yaroslav E. Romanyuk

*Empa - Swiss Federal Laboratories of Materials Science and Technology, Überlandstrasse 129,
8600 Dübendorf, Switzerland*

E-mail: yaroslav.romanyuk@empa.ch

Thin-film batteries (TFBs, sometimes referred to as lithium-ion microbatteries) are solid-state batteries that combine the advantages of solid-state batteries with thin-film, vacuum-based manufacturing processes. Microbatteries are intended to powering wireless sensors, smart cards, active RFID tags, and consumer electronics. In my talk I will present some latest research highlights about thin-film cathodes, solid electrolyte separators and anodes that can be employed in TFBs. The main limitation of TFBs is their limited capacity because the active layers are micrometer thin. One possible way to overcome this limitation is to stack several individual batteries, thus increasing capacity and total voltage while keeping fast charge rates. We demonstrate an experimental proof-of-concept consisting of two monolithically stacked all-sputtered thin-film cells and predict that stacked TFBs can ultimately achieve specific energies >250 Wh kg^{-1} at C-rates above 60, resulting in a specific power of tens of kW kg^{-1} desirable for high-end applications.