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Thierry Djenizian is the head of the flexible electronics department on the George Charpak Campus. In 2002, he received his PhD degree in Materials Chemistry from the Swiss Federal Institute of Technology in Lausanne and the Friedrich Alexander University of Erlangen-Nuremberg. His research activities are mainly focussed on the nanostructuring of materials for applications in energy storage and conversion at the micrometer scale (microbatteries). He is the author of over 80 publications in international journals and 5 book chapters. He is one Conference Chair of Porous Semiconductors Science and Technology international conferences.

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Fabrication of Li-ion microbatteries using self-supported titania nanotubes

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Nowadays, lithium-ion batteries (LIBs) are widely used to power portable devices, microelectronics, vehicles, etc. With many advantages such as high surface area and improved charge transport, self-supported 3-D nanostructured metal oxides are promising electrode materials for LIBs and their impact is particularly significant when considering the miniaturization of energy storage systems and the development of 3D microbatteries [1-3].

During this talk, it will be presented the fabrication and use of materials derived from self-organized titania nanotubes (TiO_2nts) as negative 3D self-supported electrodes for microbatteries [4–8]. This kind of 3D nanostructured electrodes is particularly interesting due to better electrochemical performance in terms of kinetics and stability during cycling.

Then, the fabrication of an all-solid-state Rocking-chair battery composed of vertical arrays of TiO_2nts as anode, a polymer thin film as electrolyte, and a $LiNi_{0.5}Mn_{1.5}O_4$ (LNMO) layer as cathode will be shown [9]. According to the electrochemical tests, this 2D full-solid microbattery showing an operating voltage of 2.1V exhibits high performance such as good discharge capacity and good capacity retention.

Finally, the current approaches developed to achieve the fabrication of a full 3D microcell will be highlighted. Particularly, the conformal electrodeposition of polymer electrolytes into tha titania nanotubes and their potential filling will be discussed [10-12].

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