Physics Colloquia
16th May 2023, 4:00 PM
Room 412, Building C

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Lithium ion batteries: the latest results on the germanium anodes developed by UNIFE

Energy storage systems have undergone a true revolution since the beginning of the 90s thanks to lithium ion batteries, enabling the technology breakthrough that led to smartphones, laptops and, most recently to the electric mobility. However, the current challenges cannot be met by the traditional storage technology, and new materials are required that could be capable of storing more charge and energy per unit of mass of the battery system. In this context, the photovoltaic laboratory of the University of Ferrara is developing a new anodic material, based on germanium, to push forward the limits of this storage system.
The electrodes are fabricated thanks to a two-step process: firstly, a thin germanium layer is realized by means of a chemical vapor deposition assisted by a plasma. This thin layer can't be directly used as anodic material, due a huge volumetric variation during lithium exchange in the battery. For this reason, a nano-structuration step is performed to remove part of the germanium film by means of electrochemical etching with hydrofluoric acid. The resulting electrodes revealed a capacity over three times higher than standard graphite and an impressive stability over cycling, throughout hundreds of cycles. This presentation will give an overview of the fabrication process, and of the most recent and interesting results.