



UNITÉ DE CATALYSE
ET CHIMIE DU SOLIDE



UNIVERSITY, Faculty : Lille, Faculty of Sciences and Technologies

Scientific field : Molecules and condensed matter / Engineering Sciences

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Laboratories : UCCS / IEMN

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Hybrid 3D micro storage device: a solution for high-voltage power supply

In this first part of the 21st century, we are facing a revolution in the digital world with the development of the Internet of Things (IoT). Nomadic connected objects (watches, drones...) play a major role in our daily lives and their energy autonomy is currently limited, forcing us to reload them frequently. For example, the battery of a drone used to film a geographical area of a few km² discharges in less than one hour on most commercial models. As soon as we consider a miniaturization of these electronic devices to map the same geographical area with micro-drones (size < 1 cm²), the mesh becomes finer but the energy autonomy of each micro-drone remains the main technological barrier.

Our project consists in the development of a new concept of hybrid micro storage device integrating, within the same component, a pseudo-capacitive micro-supercapacitor electrode and an electrolytic micro-capacitor electrode. There seems to be significant margin for progress in this technology and a strong intellectual property potential is detected.

To meet these needs, considering the surface constrain limited to that of the associated electronics, this new generation of hybrid micro-devices allowing delivering more than 10 Volts will have to use materials that can store the most energy per unit area and/or the design of three-dimensional electrodes. The guideline of this project, which represents a technological rupture with existing technology, combines application and fundamental research and covers both the understanding of storage mechanisms at the nanometric scale and the manufacture of hybrid energy storage micro-devices.

In the field of miniature embedded electronics, a single micro-storage device could power sensors, lasers, electronically scanned radar antenna arrays, military communications systems, among others to develop innovative sensor networks. To date, no results have been reported in the literature for such miniaturized storage, leaving the field of possibilities wide open...

Planned recruitment date : octobre 2020

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