Secteur des Sciences et Technologies

Invitation à la soutenance publique de thèse de

Bruno ERNOULD

Master bioingénieur : chimie et bio-industries à finalité spécialisée

Pour l'obtention du grade de Docteur en sciences

« Organic redox materials for high performance lithium batteries »

qui se déroulera
le mardi 18 août 2020 à 15h
Auditoire LAVO 51
Place Louis Pasteur, 1
1348 Louvain-la-Neuve

Jury members :

Prof. Jean-François Gohy (UCLouvain), supervisor
Prof. Eric Gaigneaux (UCLouvain), chairperson
Prof. Alexandru Vlad (UCLouvain), secretary
Prof. Charles-André Fustin (UCLouvain)
Prof. Sophie Hermans (UCLouvain)
Prof. Roberto Lazzaroni (UMons, Belgium)
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The ever-growing global economy implies a steadily increasing demand for more portable energy sources, currently relying mostly on Li- ion technology. In this context, the market is continuously asking for improved performances from Li-ion batteries (LIBs). Furthermore, not only the consumer needs are driving the research toward higher standards but also the global energy demand growth, evermore pressing the need of a cleaner and more sustainable energy supply chain. Yet LIBs are well-optimized devices and going beyond what is the current state-of-the art in the battery field entails to explore new materials and components. The quest for better batteries has shed light on materials and technologies promising improved levels of sustainability, cost-effectiveness, power density and/or energy density. In that respect, significant efforts are devoted to new organic positive electrode materials that could supersede their inorganic counterparts at all levels mentioned beforehand.

The goal of this thesis is to develop new concepts to allow a successful implementation of redox organics as positive electrode materials without any trade-off over their current inorganic counterparts. To that end, we explored different strategies based on: (i) the design of hybrid materials with near-ideal dispersion properties thanks to the covalent grafting of our nitroxide-bearing polymers on conductive carbon nanotubes, (ii) the design of a cross-hybrid structure merging the conducting properties of polyaniline with the high specific capacity of quinone redox moieties, (iii) the modulation of electrode potentials driven by changes of electrolyte composition to increase the battery voltage output.