



Secteur des Sciences
et Technologies

Invitation à la soutenance publique de thèse de
Monsieur Jean-Pierre BOURGEOIS
Master en sciences chimiques

Pour l'obtention du grade de Docteur en sciences

« Design and characterization of flexible lithium-ion batteries »

qui se déroulera
le vendredi 14 septembre 2018 à 15h00
Auditoire LAVO 51
Place Louis Pasteur, 1
1348 Louvain-la-Neuve

Membres du jury :

Prof. Jean-François Gohy (UCL), supervisor
Prof. Eric Gaigneaux (UCL), chairperson
Prof. Tom Leysens (UCL), secretary
Prof. Alexandru Vlad (UCL)
Prof. Philippe Leclere (UMons, Belgium)
Prof. Nathalie Job (ULg, Belgium)



The inherent link between human development and energy management is unquestionable. Among energy sources, electrical energy and more precisely lithium ion battery has emerged as a critical technology to power everyday life equipment. Recently, development of intelligent clothes and flexible displays or electronics has created the need for new off-grid energy solutions to be seamlessly integrated with equipment. To meet this requirement, we have considered in this thesis the creation of flexible batteries using a new process.

Firstly, we created electrodes through a filtration process. Dispersion of active materials such as LiCoO_2 or $\text{Li}_4\text{Ti}_5\text{O}_{12}$ and multi-walled carbon nanotubes were filtered to produce performing self-standing electrodes. Morphology and electrochemical properties of carbon nanotubes allowed producing conducting network supporting the active materials. The produced electrodes exhibited excellent electrochemical properties.

Secondly, a part of this work was devoted to the creation of separators. Cellulose nanofibers were individualized from soft wood pulp and filtered to produce robust separators that can be included in electrochemical cells.

Full cells were later created by sequential filtration of all the components. It was proved that this method can be envisioned to produce functional batteries in a single step at industrial scale.

Last part of this work was dedicated to the development of a method to graft polyethylene oxide on silica nanoparticles. This allowed creating electrolytes with interesting mechanical and electrochemical properties. This type of electrolyte can be included in solid state flexible configuration in a near future.