Invitation à la soutenance publique de thèse de
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Master of Engineering

Pour l'obtention du grade de Docteur en sciences

“Organic Liquid Electrolyte for Safe and High-energy Lithium-based Batteries”

qui se déroulera
le vendredi 17 juin à 10h
Auditoire LAVOSI
Place Louis Pasteur
1348 Louvain-la-Neuve

State-of-the-art lithium-ion batteries (LIBs) are approaching their limits while not being able to satisfy the ever-increasing demand for higher energy and power applications. Many next-generation high-energy rechargeable batteries have caught researchers’ attention, such as lithium metal batteries (LMBs) and anode-free lithium metal batteries (AFLMBs). However, the conventional electrolytes for LIBs cannot meet the challenging requirements of these next-generation battery configurations. Although the solid-state electrolyte technology (SSE) with its many excellent properties has been identified as a potential candidate to be applied in Li-based batteries, the current technological status of SSE is still in the early development stages as most of the applications are only successfully confirmed at the laboratory level. Thus, modified organic liquid electrolytes with tailored physicochemical properties remain the most favored choice for short to medium-term next-generation Li-based battery developments. This thesis explored two effective design strategies for organic liquid electrolytes, including the utilization of dual-salts system in the phosphate-based electrolyte to alleviate the problems of high-concentration electrolytes, and extending the traditional linear carbonate segments to obtain new dicarbonates-based electrolytes with superior high voltage stability, excellent lithium metal compatibility and non-flammability properties. This thesis also discusses the possible electrolyte formulations and their use to advance the highly promising field of AFLMBs and suggests a series of improvement strategies. Overall, this work provides guidelines on the design of electrolytes for next-generation batteries with improved performances.