

DRF: Thesis SL-DRF-19-0495

RESEARCH FIELD

Physical chemistry and electrochemistry / Physique de l'état condensé, chimie et nanosciences

TITLE

Investigating metal-oxygen batteries using in situ solid-state NMR spectroscopy

ABSTRACT

Rechargeable metal-O₂ batteries have attracted much attention in recent years as a possible alternative to the widely used lithium-ion batteries. This is particularly the case for lithium and sodium-oxygen batteries, due to their potential high energy density. However, great challenges remain in the development of M-O₂ batteries and in the understanding of the underlying mechanisms taking place inside M-O₂ batteries. Clear identifications of the discharge electrochemical pathways and their products (MO₂ or M₂O₂), as well as the reactivity of the electrolyte, are crucial. The thesis objective is to investigate the electrochemical and chemical reactions in M-O₂ batteries under real-time potential cycling using recently emerged in situ solid-state NMR spectroscopy. The thesis will consist of (1) optimizing the recently developed in situ solid-state NMR facility at LSDRM for studying metal-O₂ batteries; (2) understanding reaction mechanisms in M-O₂ systems; and (3) exploring new routes for improving the battery performance at LEEL.

LOCATION

Institut rayonnement et matière de Saclay
Service Nanosciences et Innovation pour les Matériaux, la Biomédecine et l'Energie
Laboratoire Structure et Dynamique par Résonance Magnétique (LCF)
Place: Saclay
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