



INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	Laboratoire de Chimie Moléculaire
Website of the Host Laboratory	https://portail.polytechnique.edu/lcm/fr/page-daccueil-0
Research Group	Grégory Nocton
Internship Supervisor	Thomas Simler
Internship Subject	Transformation of Gaseous Pollutants by Low-Valent Lanthanide Complexes
Student's level	<input type="checkbox"/> Advanced Undergraduate Students (3 rd or 4 th year) <input checked="" type="checkbox"/> Master's students (1 st or 2 nd year) <input checked="" type="checkbox"/> PhD students
Proposed Duration	<input checked="" type="checkbox"/> 3 months <input checked="" type="checkbox"/> 4 months <input checked="" type="checkbox"/> 5 months <input checked="" type="checkbox"/> 6 months
Internship description (max. 15 lines)	<p>Owing to the high thermodynamic stability of CO, its transformation by reductive coupling reactions, leading to multi-carbon oxygenated products, is a key but challenging goal. Such reduction reactions have typically been achieved using highly reducing complexes based on low-valent main group or f-block elements. Driven by the increasing need for sustainable and green chemistry, a recent gain of interest has been observed in this field. Divalent lanthanide complexes, especially those based on samarium(II) and thulium(II) metal centers, are very reducing complexes that can be used for the activation of CO, CO₂ and other small molecules under very mild conditions. Recent results in the laboratory have shown that a thulium(II) complex can lead to the reductive coupling of CO into C₂ and C₃ oxygenated complexes. Further reactivity studies by reaction with CO₂ and other electrophiles indicated the possibility to further functionalize the newly-formed oxygenated ligand. The aim of this thesis project is to study of the scope of this novel functionalization reactivity, investigate the mechanism and discover new ways to achieve transformation of CO and CO₂ into multi-carbon oxygenated products under catalytic conditions.</p>

The boxes marked with cross implies eligible