

ÉCOLE DOCTORALE « SCIENCES DE LA MATIÈRE, DU RAYONNEMENT ET DE L'ENVIRONNEMENT » (ED104)

UNIVERSITE : Université du Littoral Côte d'Opale

Filière doctorale : MMC (Molécules et Matière Condensée)

Titre de la thèse : Optimization of a catalytic process for the CO₂ purification derived from an oxyfuel combustion in the cement industry

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Laboratoire de Rattachement : Unité de Chimie Environnementale et Interactions sur le Vivant
EA 4492

Programme(s) de Rattachement : Thèse en cotutelle avec la Chaire ECRA / UMONS

SUJET DE THÈSE

The team “Catalytic treatment and clean energy” of the Unit of environmental chemistry and interaction on the living organisms (UCEIV, ULCO) works on the purification and the valorization of the CO₂ coming from oxyfuel combustion. In a project of the INNOCOLD institute, a first PhD on the catalytic purification of CO₂ gave good results at the micro-pilot scale.

This new PhD thesis will be joint-supervised with the ECRA Chair « From CO₂ to Energy: Carbon Capture in Cement Production and its Re-use » and the Faculty of Engineering (FPMs) of UMONS. The ECRA Chair is related to the study of CO₂ capture processes applied to the cement industry and its conversion into valuable compounds. However, the CO₂ captured has to be purified before being reused for its conversion into a valuable compound.

In the context of the CO₂ purification derived from an oxyfuel combustion, the present PhD subject deals with the study of the catalytic reduction of NO in nitrogen by the reducing agent CO which will be oxidized in CO₂. This innovative process is characterized by the challenge of high water and CO₂ contents in the flue gas to treat. Different catalytic materials will be tested in a micro-reactor and optimized. Tests at the micro-pilot scale will be also achieved, with a modelling of the catalytic process at industrial scale applied to the cement industry, allowing finally a techno-economic analysis of the process.

As the PhD thesis will be joint-supervised, the candidate will be hosted in the both universities: ULCO (France) and UMONS (Belgium).

Financement envisagé (Etablissement, région, organisme, fonds propres, durée) : Région des Hauts de France – CHAIRE ECRA / UMONS

Durée : 36 mois