Intitulé du projet : Développement de catalyseurs zéolithiques bifonctionnels à extra large pores pour la valorisation énergétique des déchets plastiques

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Acronyme du projet : **VALOPLAST** : **VALO**risation des déchets **PLAST**iques

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Etablissement porteur : LCS, université de Caen Normandie

Financement Bourse de l'établissement

Localisation du projet (nom du laboratoire et adresse) : LCS, 6 bd maréchal juin 14050

Discipline du projet : chimie des matériaux

Partenaire : Valentin Valtchev

Coordinateur du projet dans le laboratoire d'accueil :

Nom : al lakiss

Prénom : louwanda

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Si laboratoire sur plusieurs sites, précisez le lieu : Ville / Campus / Établissement hébergeur

Équipe de recherche (si existante) : Zéolithes

Adresse : 6 bd marechal juin

N° - Libellé de la voie :

Code postal : 14050

Commune : Caen

École doctorale de rattachement du directeur de thèse : *DN EGN HSRT MIIS NBISE NC NH PSIME*

Période d'exécution du projet : 3 ans

Du *01/10/2025* au *01/10/2028*, soit *36* mois de projet.

RÉSUMÉ DU PROJET

VALOPLAS project aims to develop bifunctional zeolite catalysts with extra-large pores for plastic wastes upgrading. These solid wastes currently represent a major ecological challenge due to their non-biodegradability. Meanwhile, the demand for hydrogen, a clean energy carrier, continues to grow in response to the energy needs of our society as it gradually moves towards decarbonizing energy sources to reduce the greenhouse gas emissions and mitigate global warming.

There are numerous methods for plastic wastes upgrading, such as mechanical recycling, pyrolysis, gasification, and other unconventional alternatives like photo and bio-microbial degradation. Among these methods, catalytic pyrolysis using zeolite catalysts is garnering increasing interest and is widely studied in the literature. Recently, new zeolitic structures with extra-large pores that surpass the conventional porosity size of zeolites have been discovered; examples include ZEO-1 with a channel opening of 1.4 nm and ZMQ-1 with a channel opening reaching up to 2.3 nm. These new structures could serve as more effective and selective catalysts for plastic upgrading.

The main objective of this project involves developing new bifunctional catalysts based on ZEO-1 and ZQM-1 for producing hydrogen and value-added hydrocarbons from plastic wastes. The catalysts prepared in LCS will be thoroughly characterized using classical and advanced characterization methods available at LCS (XRD, TGA, Nitrogen sorption, solid state NMR, IR, etc…) before being studied in plastic pyrolysis. Polyethylene and polypropylene will be chosen as model molecules before moving to real feedstocks tests.