Elaboration de $Ti0_2$ dopé pour les applications photocatalytiques

Doctorant·e
ZAHWA Israa

Direction de thèse
HOUIVET David (Directeur·trice de thèse)
HAMIEH TAYSSIR (Co-directeur·trice de thèse)

Date de la soutenance
10/12/2024 à 09:00

Lieu de la soutenance
ESIX Normandie, Cherbourg

Rapporteurs de la thèse
DESCHANELS XAVIER Directeur de recherche CEA Marcoule
LEBEAU BÉNÉDICTE Directeur de recherche Université de Haute-Alsace

Membres du jurys
DESCHANELS XAVIER, Directeur de recherche, CEA Marcoule
HAMIEH TAYSSIR, , Université Libanaise
HOUIVET David, Maître de conférences, Université de Caen Normandie (UCN)
KASSAS Ahmad, , Internationnal university of Beirut
LEBEAU BÉNÉDICTE, Directeur de recherche, Université de Haute-Alsace
LERICHE ANNE, , UNIVERSITE VALENCIENNES UVHC
MOUYANE Mohamed, , Université de Caen Normandie (UCN)
YOUSSEF LAURÈNE, Maître de conférences, Université de Limoges

Abstract
The research presented in this thesis focuses on the synthesis and photocatalytic performance of doped TiO2 materials, in particular TO2-LiF and TO2-Mo systems. Using flash combustion and solid-state synthesis methods, the study aims to improve the properties of the materials, including surface area and phase composition. Characterization of these materials was carried out using a range of techniques such as X-ray diffraction (XRD) to determine phase composition, thermogravimetric analysis (TGA) for thermal stability, scanning electron microscopy (SEM) for morphological analysis, BET surface measurements to analyze porosity, diffuse reflectance spectrum (DRS) to determine the band gap of the samples and Electron Paramagnetic Resonance (EPR) to study the paramagnetic defects and active centers involved in the photocatalytic mechanisms of the sample. The photocatalytic activity of these materials was evaluated by degradation of methylene blue (MB) and tetracycline (TC) under visible light irradiation. The results indicate a significant improvement in photocatalytic efficiency compared to commercial TO2. Furthermore, the study explores the effect of anatase-rutile phase transitions and various dopants on photocatalytic performance. These findings provide valuable insights into the optimization of TiO2-based photocatalysts for water photodecontamination applications.