

11-007

PHOTO ACTIVITY OF MULTILAYER FILMS IN THE PRODUCTION OF METHANOL VIA CO₂ REDUCTION

Nogueira, M.V.(1); Zaghete, M.A.(2); Monteiro Filho, E.S.(1); Silva, G.C.(1); Flumignan, D.L.(3); Teodoro, M.D.(4); Longo, E.(5); Perazolli, L.A.(6);
(1) IQ/UNESP; (2) IQAr-UNESP; (3) IFSP; (4) UFSCAR; (5) UNESP; (6) IQ-UNESP;

This present work assessed the oxidative and reductive photocatalytic properties of powders fixed in the form of thick and porous TiO₂ films in multilayers modified with niobium, tantalum and tungsten obtained by the Pechini method and the surface modification by the metallic Pt deposition through sputtering. The structural modification of TiO₂ with these metals aimed at replacing Ti⁴⁺ by Nb⁵⁺, Ta⁵⁺ and W⁶⁺, which promoted, besides the increase in the electron-hole pair recombination time, the generation of electron donor levels in the crystalline structure and the surface modification of the films with metallic Pt deposited by sputtering that acted in the conduction of photogenerated electrons. The films were characterized using the techniques PL and SEM/EDS to verify their morphology and the presence of characteristics defects. The photochemical assays of methanol formation from CO₂ were performed in aqueous medium. To assess the methanol produce, samples were analyzed by GC to quantify the its formation. The best result achieved by the surface modification with Pt dots was observed on (Ti / SnO₂ / Pt / TiO₂500°C / Pt?) film that produced 6,2 ppm of methanol in 24 h reaction, concentration higher than achieved by the photocatalyst powder TiO₂500°C (which has higher specific surface area) that reached 2,7 ppm.