

Preparation of TiO₂/CdS/GO/Pt nanocomposite to produce methane from waste CO₂

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XRD results showed that TiO₂ exhibited crystalline properties and the peaks at 2θ values of 25.63°, 37.5° and 48.4° can be indexed to the (102), (005) and (200) planes of anatase titania. The XRD emissions from the rutile phase showed that TiO₂ disappear in the TiO₂/CdS nanocomposite since anatase form is dominated in TiO₂. Very low platinum signals was detected from TiO₂/CdS/Pt since the platinum percentage is low. HR-TEM image of the TiO₂/CdS nanocomposite exhibited that it was accumulated on a copper grid. SEM images exhibited that Pt nanoparticles are homogeneously dispersed over GO. HAADF images of the TiO₂/CdS/rGO/Pt nanocomposite exhibited that both Pt and TiO₂/CdS nanoparticles are supported on the surface of GO. The effects of increasing TiO₂/CdS/GO/Pt nanocomposite concentration (0,1;0,2;0,5 and 1 mg/l), GO percentages (5%, 10%,15%,20%), sunligh powers(1 W/m²; 3, 5, 10 and 15 W/m²), sunligh duration (10 min,20,40,50 and 70min) on the methane production from waste CO₂ was investigated. Furthermore, the effects of waste CO₂ concentrations on the methane production was studied. A cost analysis was performed for methane production from CO₂. After 50 min illumination time at a 0,5 mg/l TiO₂/CdS/GO/Pt nanocomposite dose at a GO percentage of 10%, at a sunligh power of 1 W/ m² from 10 mg/l CO₂ gas 35 mg/day CH₄ gas was produced.

Keywords: TiO₂/CdS/GO/Pt nanocomposite, Methane, Waste CO₂, Photooxidation.

Biography

Delia Teresa Sponza is currently working as a professor at Dokuz Eylül University, Department of Environmental Engineering. Scientific study topics are; Environmental engineering microbiology, Environmental engineering ecology, Treatment of fluidized bed and activated sludge systems, Nutrient removal, Activated sludge microbiology, Environmental health, Industrial toxicity and toxicity studies, The effect of heavy metals on microorganisms, Treatment of toxic compounds by anaerobic / aerobic sequential processes, Anaerobic treatment of organic chemicals that cause industrial toxicity and wastewater containing them, Anaerobic treatability of wastewater containing dyes, Treatment of antibiotics with anaerobic and aerobic sequential systems, Anaerobic and aerobic treatment of domestic organic wastes with different industrial treatment sludges, Treatment of polyaromatic compounds with bio-surfactants in anaerobic and aerobic environments, Treatment of petrochemical, Textile and olive processing industry wastewater by sonication, Treatment of olive processing industry wastewater with nanoparticles and the toxicity of nanoparticles. She has many international publications.

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