

**THE EFFECT OF IRON DOPING TO OPTICAL PROPERTIES OF ZnO NANOPARTICLES AND ITS APPLICATION IN CO<sub>2</sub> HYDROGENATION**

**Haythem Basheer, Mohit Yadav, András Sápi**

*Department of Applied and Environmental Chemistry, University of Szeged, H-6720, Hungary  
e-mail: haythemsuliman@gmail.com*

**Abstract**

Global warming and pollution are a big challenge facing humanity and CO<sub>2</sub> emission is one of these issues. So, recycling Carbon dioxide to added value hydrocarbon is one of the solutions. In this research CO<sub>2</sub> has been Photocatalytic hydrogenated using ZnO doped Fe synthesized by co-precipitation method with different Iron ratios. The samples were characterized using X ray Diffractometer (XRD) and UV Visible Refractance Spectroscopy. The CO<sub>2</sub> photo-hydrogenation was taken place in Glass Photoreactor in batch mode using UV lamp. The XRD revealed formation of single phase of hexagonal ZnO and UV visible spectroscopy determine the maximum absorption and the band gap were calculated. Scanning Electron Microscope (SEM) and (EDS) were used to investigate the surface morphology and the composition. The Photocatalytic test results showed an enhancement in the photocatalytic activity for the doped samples with 22%, 47% conversion and 99.9% CO selectivity with small traces of CH<sub>4</sub> selectivity to CO for ZnO pure and iron doped ZnO respectively.

**Keywords:** *Photocatalysis, Hydrogenation, Band gap, CO<sub>2</sub> and doping*