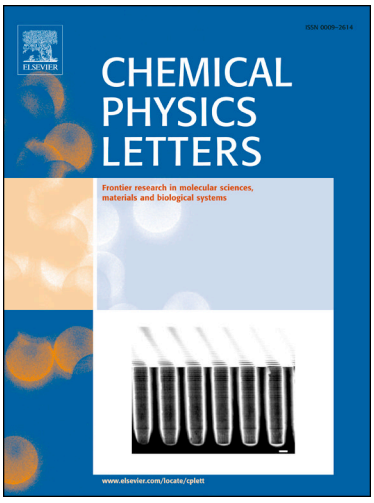


Research paper

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S.R. Lingampalli, Mohd Monis Ayyub, Ganesan Magesh, C.N.R. Rao

PII: S0009-2614(17)30986-7
DOI: https://doi.org/10.1016/j.cplett.2017.10.048
Reference: CPLETT 35197

To appear in: *Chemical Physics Letters*

Received Date: 6 June 2017
Accepted Date: 24 October 2017

Please cite this article as: S.R. Lingampalli, M. Monis Ayyub, G. Magesh, C.N.R. Rao, Photocatalytic reduction of $CO_2$ by employing $ZnO/Ag_{1-x}Cu_x/CdS$ and related heterostructures, *Chemical Physics Letters* (2017), doi: https://doi.org/10.1016/j.cplett.2017.10.048

# Photocatalytic reduction of $CO_2$ by employing $ZnO/Ag_{1-x}Cu_x/CdS$ and related heterostructures

S. R. Lingampalli, Mohd Monis Ayyub, Ganesan Magesh and C. N. R. Rao*

New Chemistry Unit, CSIR-Centre of Excellence in Chemistry, International Centre for Materials Science, Sheikh Saqr Laboratory, Jawaharlal Nehru Centre for Advanced Scientific Research, Jakkur, Bangalore – 560064.

*For correspondence email: cnrrao@jncasr.ac.in

KEYWORDS: $CO_2$ reduction, Heterostructures, Photocatalysis, Zn-Cu alloy.

## Abstract

In view of the great importance of finding ways to reduce $CO_2$ by using solar energy, we have examined the advantage of employing heterostructures containing bimetallic alloys for the purpose. This choice is based on the knowledge that metals such as Pt reduce $CO_2$, although the activity may not be considerable. Our studies on the reduction of $CO_2$ by ZnO/M/CdS (M = Ag, Au, $Ag_{1-x}Au_x$, $Ag_{1-x}Cu_x$) heterostructures in liquid phase have shown good results specially in the case of $ZnO/Ag_{1-x}Cu_x/CdS$, reaching a CO production activity of 327.4 μmol $h^{-1}g^{-1}$. The heterostructures also reduce $CO_2$ in the gas-phase although the production activity is not high. Some of the heterostructures exhibit reduction of $CO_2$ even in the absence of a sacrificial reagent.

## 1. Introduction

Drastic reduction of $CO_2$ in the atmosphere has become imperative to save the environment. One way of accomplishing this objective is to use solar energy for the conversion of $CO_2$ to useful chemicals. Photocatalytic reduction of $CO_2$ on suspended semiconductor-powders was reported some years ago by Fujishima et al.[1] $TiO_2$, ZnO, CdS and SiC have been employed as