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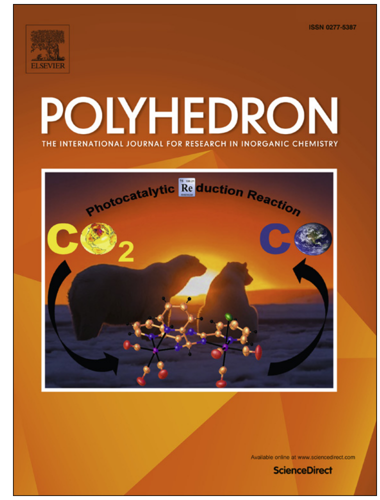


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# A new inorganic-organic nanohybrid based on a copper(II) semicarbazone complex and $PMo_{12}O_{40}^{3-}$ polyanion: synthesis, characterization, crystal structure and photocatalytic activity for degradation of cationic dyes

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**ABSTRACT**

A new inorganic-organic nanohybrid based on Keggin-type polyoxomolybdate and a copper(II) semicarbazone complex, namely $[Cu_2(HL)_2(PMo_{12}O_{40})(OCH_3)_2(Cl)(H_2O)].8CH_3OH\cdot 4H_2O$ [HL=pyridine-2-carbaldehyde semicarbazone] (**1**) was synthesized by a sonochemical method. The single crystal of (**1**) was synthesized with the branched tube method. The nanohybrid (**1**) was characterized by using FT-IR, PXRD, FESEM, TEM, EDX, UV-Vis, TG-DTA analysis and single-crystal X-ray diffraction. Single-crystal X-ray diffraction reveals that the $PMo_{12}O_{40}^{3-}$ cluster acts as a bidentate inorganic ligand and coordinates two symmetrically equivalent $[Cu(Cl)_{0.5}(HL)(OCH_3)(H_2O)_{0.5}]$ complexes. SEM and TEM images confirmed highly porous plate like morphology of the nanohybrid sample. To the best of our knowledge, the sample (**1**) represents the first example of a hybrid based on POMs and semicarbazone Schiff base complexes. The photocatalytic properties of nanohybrid (**1**) were investigated in detail and the results of photocatalytic experiments show it can be used as an efficient and recoverable photocatalyst for the complete degradation of cationic dyes as methylene blue (MB) and rhodamin B (RhB).

*Keywords:* Inorganic-organic hybrid, Semicarbazone complex, Nanohybrid, photodegradation, cationic dyes.

## 1. Introduction

Polyoxometalates (POMs) are typical class of metal-oxygen clusters, with an unmatched range of physical and chemical properties such as thermal and oxidative stability, Bronsted acidity and magnetic properties [1-6].The study of POMs is not only