

Accepted Manuscript

Research paper

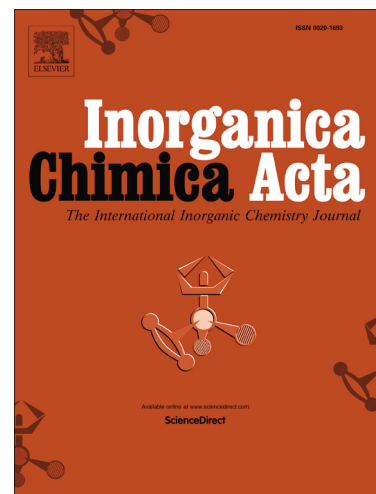
Preparation, Characterization and Photocatalytic Properties of Diiron Mimic Modified Nano Silica

Meng Cao, Zhenxi Wang, Jian Zhang, Sheng Xu, Shangxi Zhang, Xin Dai, Xinde Jiang

PII: S0020-1693(17)30905-2
DOI: <https://doi.org/10.1016/j.ica.2017.09.007>
Reference: ICA 17863

To appear in: *Inorganica Chimica Acta*

Received Date: 9 June 2017
Revised Date: 30 August 2017
Accepted Date: 1 September 2017



Please cite this article as: M. Cao, Z. Wang, J. Zhang, S. Xu, S. Zhang, X. Dai, X. Jiang, Preparation, Characterization and Photocatalytic Properties of Diiron Mimic Modified Nano Silica, *Inorganica Chimica Acta* (2017), doi: <https://doi.org/10.1016/j.ica.2017.09.007>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Preparation, Characterization and Photocatalytic Properties of Diiron Mimic Modified Nano Silica[†]

Meng Cao, Zhenxi Wang^{*}, Jian Zhang, Sheng Xu,

Shangxi Zhang, Xin Dai and Xinde Jiang

College of Sciences, Nanchang Institute of Technology, Nanchang 330099, China

Abstract: Diiron mimic modified Nano Silica(**1**) was synthesized in three steps. The intermediate(**2**, **3**) and final product(**1**) were characterized by SEM(EDX), elemental analysis, FT-IR, XRD, TG-DTA and AAS. The diiron mimic modified Nano Silica(**1**) could be considered as a new heterogeneous [FeFe]-hydrogenase model. In addition, **1** was applied to a photocatalytic hydrogen production system which made up of photosensitizer([Ir(ppy)₂(bpy)]PF₆), electron sacrifice(TEA), proton source(H₂O) and solvent(acetonitrile). The turnover number was 324 for surface modified catalyst and 60 for photosensitizer in 5 hours of illumination. The study of the recovered catalyst found that most of the catalysts were broken down within 5 hours of catalytic reaction.

Keywords: Nano Silica, Surface Modification, Hydrogenase model, Photocatalytic hydrogen production.

1. Introduction

Fossil fuels are about to be exhausted in the next few decades. Scientist are trying to find alternatives to fossil energy. It is widely accepted that hydrogen is an ideal energy carrier^[1] to replace them. Actually, hydrogen powered vehicles are being developed and are expected to replace gasoline powered vehicles. However, to make hydrogen our major energy source practicably, we must produce hydrogen with low cost and sufficient efficiency firstly. But so far, this has been a great challenge for us. As far as we know, the vast majority of H₂ is produced by the cracking reaction of methane^[2]. This method consumes fossil fuels and additional energy, even accompanied by carbon dioxide emissions. So this method of hydrogen production is not sustainable and almost meaningless in terms of energy efficiency. In contrast,

^{*} Corresponding author. [†]Electronic supplementary information (ESI) available: Other magnification of SEM images of nanoparticles, Fig. S1 for **1**, Fig. S2 for **2**, Fig. S3 for **3**, Fig. S4 for Nano silica; XRD of nanoparticles Fig. S5.
E-mail address: wangzhenxi1978@126.com

Download English Version:

<https://daneshyari.com/en/article/5151438>

Download Persian Version:

<https://daneshyari.com/article/5151438>

[Daneshyari.com](https://daneshyari.com)