

## Growth of 2,2-biimidazole based Nanorods on Mica Substrate

Reviewer comments “This work reports on the preparation and characterization of Ag-H2biim nanorods. The results are interesting and recommended for publication after addressing the following points:

(1) X-ray powder diffraction of the nanorods should be conducted to identify the nature of the nanorods.

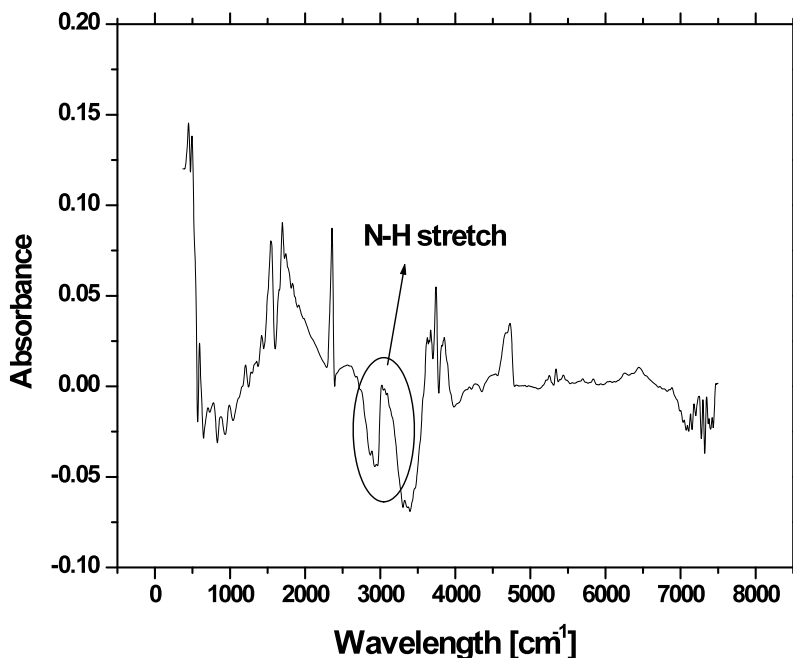
(2) The impact of the K<sup>+</sup> ions on the formation of the nanorods should be explained in detail in the text.”

*\*As per your rating, we have revisited the language of the document so as to make it more readable.*

1. The x-ray diffraction has been employed to better understand the crystal and molecular structure of [Ag(NO<sub>3</sub>)(H2biim)]<sub>n</sub> by another group (reference 12):

C. A. Hester, R. G. Baughman, H. L. Collier, A simple helix based on 2,2'-biimidazole. Crystal and molecular structure of [Ag(NO<sub>3</sub>)(H2biim)]<sub>n</sub>, *Polyhedron* **1997**, *16*, 2893.

- Their data showed that silver (I) nitrate and H2biim crystallize from an aqueous solution to afford a single stranded helix. In their paper, Hester et al. discussed the structure of the helix in details which is beyond the scope of this paper.
- To satisfy the reviewers comment we have added the following to the introduction, page 3 line 14-18:  
“Hester et al.<sup>[12]</sup> showed that silver(I) nitrate and H2biim crystallize from an aqueous solution to afford a single stranded helix, as evidence by X-ray crystallography. They found that this assembly is based on an approximate *cis* conformation of H2biim acting in concert with the preferred linear two coordinate nature of the ligated silver (I) atom. Such a nanostructure has promising potential for use in the area of nanotechnology mainly because of its unique electrical properties and its structural similarity to naturally occurring nucleic acids<sup>[12,23]</sup>.”
- We also added the following to the “Growth and Deposition of the Nanorods “ sections on page 3 line 18-22.  
“FTIR analysis of the deposited compound confirmed the results obtained previously by Hester et al.<sup>[12]</sup>; both showing the characteristic N-H stretch (3141-2810 cm<sup>-1</sup>) of H2biim and the ionic nitrate absorption (1360cm<sup>-1</sup>), indicating that the product is a complex involving both AgNO<sub>3</sub> and H2biim.”



**Figure 1:** FTIR spectrum for the deposited compound  $[\text{Ag}(\text{NO}_3)(\text{H}_2\text{biim})]_n$  showing the characteristic N-H stretch

2- The impact of K<sup>+</sup> ions on the formation of the nanorods was explained in more detail in the text. In addition we added to references related to this subject [26, 27].

- “The surface of mica is negatively charged and hydrophilic due to the dissociation of the potassium cations from the mica surface. Previous studies reported that potassium ions in mica are easily replaced with other ions (such as H<sup>+</sup>) when mica is treated with different solutions. [26, 27] The ion exchange process is quick and efficient. In order to understand the role of K<sup>+</sup> ions present on the mica surface in the nanorods growth, two control experiments were performed, under the same conditions and a deposition time of 10 min, on two different substrates: a cleaved mica surface annealed at 350 °C and a SiO<sub>2</sub> substrate. The surface of freshly cleaved mica is inherently negatively charged in water. The results showed the formation of non-homogeneous three-dimensional aggregates. No nanorods were observed on the annealed mica and the SiO<sub>2</sub> surfaces as shown in the AFM topography images of Figures S 2a and S 2b, respectively. Therefore, we can deduce that the active K<sup>+</sup> ions on the Mica surface are required for the formation of these nanorods. Additionally, these potassium ions are a critical factor in controlling the nucleation and morphology of nanostructures.”
- [26] Lei Xu and Miquel Salmeron, Effects of Surface Ions on the Friction and Adhesion, *Langmuir* 1998, 14, 2187-2190.

- [27] Dave E. Dunstant, Forces between Mica Surfaces in CaC12 Solutions, *Langmuir* 1992, 8, 740-743.