

Porphyrin Nanorods Characterization for an Artificial Light Harvesting and Energy Transfer System

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Abstract: Understanding growth mechanism of porphyrins nanorods by self assembly and molecular recognition is essential for their successful implementation in nanodevices. Optical spectroscopy and FTIR were used to investigate growth mechanism immediately after mixing and onwards. These porphyrins nanorods can be organized into structures performing essential light-harvesting and energy transfer roles.

1. Introduction

The self assembly by molecular recognition of porphyrin based systems into different nano-scaled geometric structures has been an intense area of research [1]. Using the free base and diacid forms of tetrakis (4-sulfonatophenyl) porphine, and by varying the ionic strength of aqueous solutions used, Schwab et al were able to form single and bundled nanorods [1], whereas Wang et al used a mixture of tetrakis (4-sulfonatophenyl) porphine and Sn (IV) tetrakis(4-pyridyl)porphyrin to form a mixture of nanotubes and nanorods [2]. In both studies, non-covalent methods were used to produce porphyrin based nanostructures imitating, at a certain extent, natural chlorophyll. This study reports synthesis, growth mechanism process, and optical optimization of very long ordered nano-rods/ nanotubes of Sn-H⁺ based porphyrins for both linear and nonlinear optical applications [3]. The main target is to incorporate the nanotubes/nanorods onto a support to obtain an array that can be directly used as a device for light harvesting imitating natural leaf chlorophyll antennas.

2. Results

Fig.1 shows the dynamic of peak ratio which illustrate that as aggregates are forming, with time there are changes observed in the absorption spectra. Changes in the bending and stretching vibrations involved in the process of nanorods formation are also observed from FTIR spectra in Fig.2.

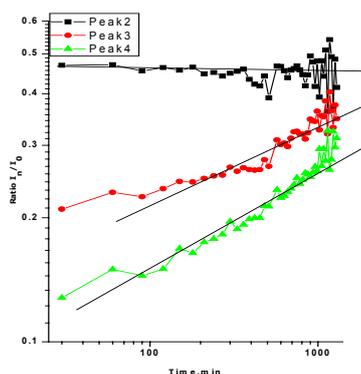


Fig. 1: UV-vis absorbance peak ratio spectra

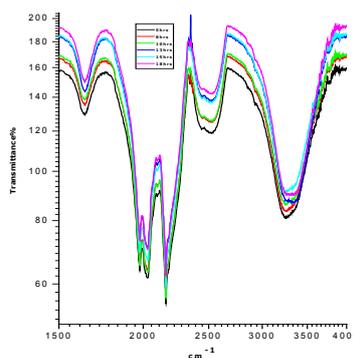


Fig. 2: FTIR spectra the growth mechanism of porphyrin nanorods

3. References

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