

Growth of PbS Nano Particles and its Effect on Protein

Satyajit Saha

Department of physics & Technophysics
Vidyasagar University, Midnapore-721101 West-Bengal, India

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ABSTRACT

To understand the physical basis of the biological activity of nanoparticles (NPs) in biomedical/nanomedicine applications in a better way, we report the results of the extent of interaction as well as the formation of a bioconjugate of albumin (BSA) with Lead Sulphide (PbS) NPs. We have performed TEM & TED measurement to show the interaction of BSA protein with PbS NPs.

Keywords: nanoparticles, bioconjugate, protein.

1. Introduction

Chalcogenides, especially of cadmium, lead and zinc, have proved their potential as efficient absorbers of electromagnetic radiation [1–3]. PbS nanoparticles have important application in various fields. There are various methods to prepare PbS nanoparticles. Some of the above mentioned methods have some drawbacks. Used precursors are unstable causing environmental hazards and require very high temperature. These methods are not cost effective also. Hence a simple chemical reduction route has been preferred to grow PbS nanoparticles which are supposed to interact with protein.

2. Experimental Section

A stoichiometric amount of anhydrous PbCl₂, Sulphur and Sodium Borohydride has been taken. THF has been used as a capping agent. Sodium borohydride acts as a reducing agent of sulphur. The stirring has been continued for 3 hours at a particular speed using a magnetic stirrer. PbS nano-particles are grown. TEM & TED of the as-prepared sample has been taken using JEOL-JEM-200 transmission electron microscope operating at 200 kV. 1mg of PbS nano particles are dispersed with in water(10ml) using ultrasonicator. 1mg of BSA protein is mixed in water(10ml). The above solutions are mixed to initiate the reaction between protein and PbS NPs. TEM & TED of the as-prepared sample has been taken

3. Results and Discussions

TEM OF PbS nanoparticles are shown in figure 1 whereas its interaction with BSA protein is shown in Figure 2.

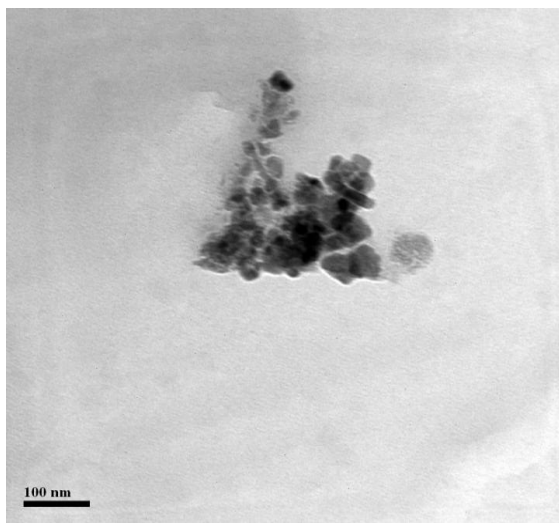


Figure 1. TEM image of PbS nano particles

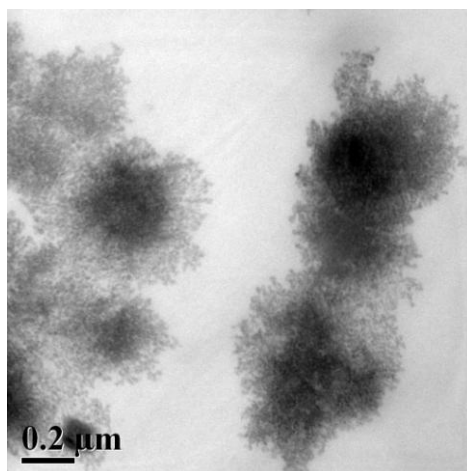


Figure 2. TEM of PbS-BSA conjugate

The average particle size of PbS NPs is of the order of 20 nm as shown in figure1. Fig.2 clearly shows that BSA proteins are attached with the PbS NPs. This clearly

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indicates that PbS nanoparticles interact with BSA protein & this induces the conformational change of BSA.

4. Conclusions

TEM photograph (Fig.1) shows nanoparticles are formed & Fig.2 shows nanoparticles are interacted with BSA. TEM measurement confirms that there is a strong interaction between Tryptophan moieties of BSA and PbS NPs[4-5]. PbS NPs causes the conformational changes of BSA.

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