

Size Controlled Fabrication of Prussian Blue Nano Pillars

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Prussian Blue (PB), the well known prototypic mixed valent hexacyanoferrate received enormous attention of researchers in the fields of dye pigments, electro catalysis, electro chromism, ion-exchange, ion-sensing, molecular magnetism and photo magnetism to name a few. The open structure of the cyano bridged Fe(II/III) ions, strong charge transfer nature seem to be the factors responsible for its varied properties.

Also, rapidly changing future needs, demand miniaturization of bulk substances down to nanometer scale. Selective fabrication of materials down to nanometer scale is crucial for obtaining nano structures of desired size and shape, which may show promising properties. Besides, several techniques to prepare nano structures, deposition in porous alumina nano pores is becoming a promising approach in recent years for fabricating nano materials of desired size and shape.

Miniaturizing the multipurpose PB, may show size dependent properties, which may show improvement over existing properties. With this fact in mind, we attempted to fabricate PB nanopillars, chemically in anodic porous alumina. Our method of nano pillar fabrication is simple and easy to control the pillar length.

Dipping the porous alumina membrane for 30 min. in equimolar (20 mM) mixture of $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ and $\text{K}_3\text{Fe}(\text{CN})_6$ in 0.01 M HCl resulted in the formation of PB nanopillars embedded in the porous alumina membrane. Chemical etching in H_3PO_4 and H_2CrO_4 mixture to remove the porous alumina membrane resulted in the free standing PB nano pillars. The free standing nano pillars are characterised by IR, UV and Scanning electron microscopy.

The details of membrane preparation, PB nano pillar fabrication and characterisation will be presented.

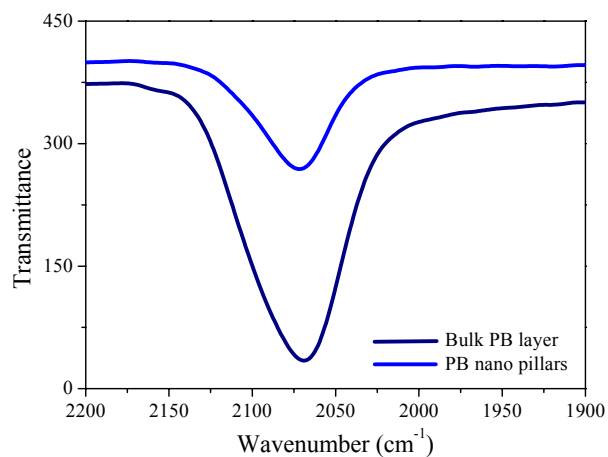


Figure 1. IR spectrum of PB nano pillars and bulk PB layer.

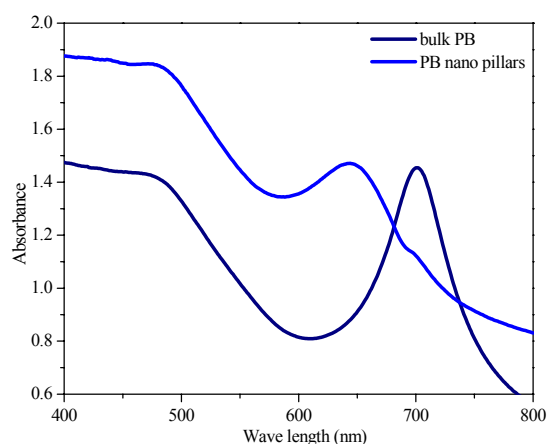


Figure 2. UV spectrum of PB nano pillars and bulk PB layer.

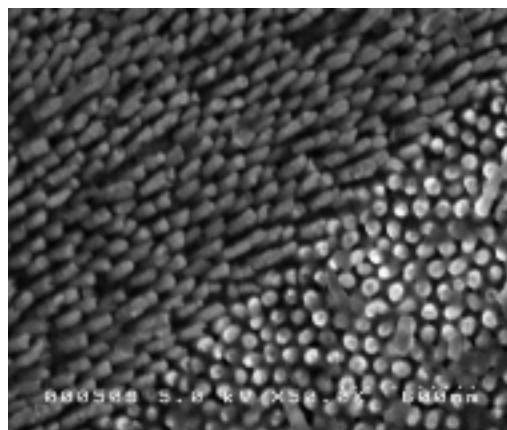


Figure 3. SEM image of the free standing PB nano pillars.