

Study on the electronic absorption and surface morphology of phthalocyanine double layer thin films

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The electronic absorption and surface morphology evolution of two types of molecular double layer thin films, copper phthalocyanine(CuPc) layer deposited on top of chloro[phthalocyaninato]boron(III) (SubPc) layer, denoted as SubPc/CuPc, and vice versa, at various thicknesses were investigated using ultraviolet(UV)-visible spectroscopy and atomic force microscopy (AFM). Both types of double layer structures showed similar broadened absorption patterns in UV-visible region which were well consistent with fitted spectra by a simple linear combination of single layer absorption spectra of two materials. In contrast, the surface morphology of double layer structures was dependent on the order of deposition. For CuPc/SubPc structures, the surface morphology was characterized by elongated grains, characteristic of SubPc thin films, indicating the morphological influence of underlying CuPc layer on subsequent SubPc layer was not large. For SubPc/CuPc structures, however, the underlying SubPc layer acted as a morphological template for the subsequently deposited CuPc layer. It was also observed that the grain size of CuPc layer varied by the thickness of underlying SubPc layer.

Keywords: copper phthalocyanine, CuPc, chloro[phthalocyaninato]boron(III), SubPc, double layer, thin films