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Simple Morphological Control of ZnPc Thin Films Grown on SubPc Underlayer[#]

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#This paper is dedicated to Professor Kwan Kim on the occasion of his honorable retirement.

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Abstract

Morphological templating in molecular double-layer thin films, *i.e.*, the phenomenon

where the surface morphology of the top layer is strongly influenced by that of the underlying layer, was investigated to control the surface nanomorphology of zinc phthalocyanine (ZnPc) thin films. Three types of molecular thin films, ZnPc single layer, chloro[subphthalocyaninato]boron(III) (SubPc) single layer, and ZnPc on SubPc (SubPc/ZnPc) double layer thin films were grown on glass substrates and post-annealed at 250 °C. While the changes in surface roughness and morphology of the ZnPc single layer were negligible during post-annealing, the roughness of the SubPc/ZnPc double layer significantly increased, similar to that of the SubPc single layer film. However, the lateral size of the surface crystallites of the SubPc/ZnPc film did not change apparently. Consequently, the fabricated regular, nanopillar-like surface morphology obtained by this simple treatment is expected to provide desirable interdigitated donor-acceptor interface with large contact area for small-molecule organic photovoltaic device applications. In addition, the ZnPc and SubPc single layer thin films showed absorption maxima in different spectral regions; hence, the double layer film absorbed the incident light effectively in a broader spectral range.

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