

New iCVD organic material for thin film encapsulation and its application to organic solar cells

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A thin film encapsulation (TFE) was fabricated by alternatively depositing organic and inorganic layers via initiated chemical vapor deposition (iCVD) and atomic layer deposition (ALD). Poly(1,3,5-trimethyl-1,3,5-trivinylcyclotrisiloxane) (pV3D3), a highly crosslinked organosilicone polymer, was introduced as a new material for the organic layer within TFE. The interface with ALD Al₂O₃ layer was smooth and stable. The pV3D3/Al₂O₃ multilayer TFE exhibited high light transparency and outstanding barrier property. Finally, the multilayer TFE was monolithically deposited on organic solar cells (OSCs) and the shelf life of the devices was immensely increased while its initial power conversion efficiency (PCE) was unaffected. It suggests that the newly developed organic/inorganic multilayer TFE is an effective barrier to elongate the lifetime of organic electronics.