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Remote plasma assisted deposition of organic luminescent thin films as UV active components in photonic structures

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In this communication we present a new approach to the fabrication of UV active organic films and their unprecedented implementation as active components in photonic structures that can be useful for the fabrication of devices such as UV-sensors, UV-to-visible wavelength shifters and UV-filters An important property of these materials is that, even for relatively large layer thicknesses, the emitted light is not reabsorbed by the film. In our preparation procedure, the films are deposited in vacuum at room temperature by sublimating an organic dye in the downstream region of a low power microwave plasma. The main difference from a standard vacuum deposition or a plasma polymerization process is that the interaction with the plasma produces the fragmentation of only a fraction of the dye molecules in the gas phase creating highly reactive molecular moieties that form a polymeric-like film onto the substrate surface.[1-3] The resulting material is a polymeric film with a given percentage of integer luminescent dye molecules embedded in it that depicts quite different properties than those of layers obtained by the direct sublimation of molecules. The films have been characterized by XPS, FT-IR and ToF-SIMS techniques and their optical properties analyzed by UV–vis and ellipsometry spectroscopies. In addition, several examples of real photonic devices incorporating the luminescent organic thin films will be presented.
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