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FABRICATION OF CHEMICALLY LINKED DYE-IN ORGANIC HYBRID MULTILAYERS AND THEIR OPTICAL/ELECTRONIC PROPERTIES

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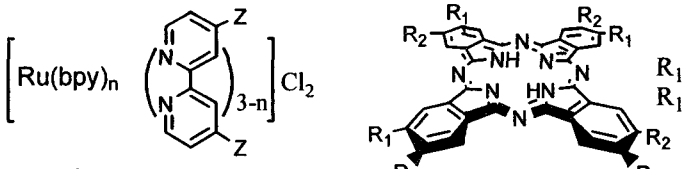
Recently, dye molecules have been extensively applied, from viewpoints of functional nano- materials, to a vareity of electronic and biological devices. A fundamental subject in applications of dyes to devices is the fabrication of chemically and mechanically tough nanofilms on solid substrates. As extention of our related works, we have developed an effective way for the fabrication of chemically linked dye-inorganic hybrid multilayers using ruthenium(II) complexes (RuL2+) and phthalocyanines (MPc) as the dye molecules, because of their excellent photofunctionalities and high chemical stability.

The fabrication of the hybrid multilayers is based on the facile reactions of the PO3H2 group with ZrOCl2to form the P(O)-O-Zr(IV) bond and the Si(OR)3 group with Ti-OH to give the Si-O-Ti(IV) linkage. So, we prepared RuL2+ having different number of the 2,2′-bipyridine-4,4′-diphosphonic acid ligand and MPc with 4 or 8 polymethylene chains having the Si(OEt)3 end group. A quartz or ITO substrate was pretreated with H2N(CH2)3Si(OEt)3/POCl3 for RuL2+ or with Ti(OBu)4/H2O for MPc and then was sequentially dipped into solutions of RuL2+ and Zr(O)Cl2 or into solutions of MPc and Ti(OBu)4 the RuL-P(O)-O-Zr(IV) or MPc-Si-O-Ti(IV) linked multilayers were thus formed. We report mainly details of the RuL2+/Zr(IV) hybrid involving the photophysical/electrochemical properties and also briefly interesting electronic behavior of the MPc/Ti(IV) hybrid nanofilms.



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