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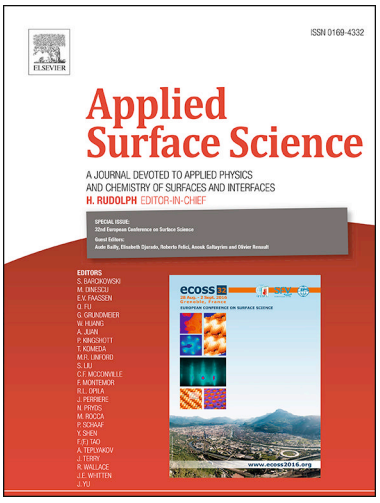

Full Length Article

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Fabrication of multicolor fluorescent polyvinyl alcohol through surface modification with conjugated polymers by oxidative polymerization

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Abstract.

A simple method for the preparation of multicolor polyvinyl alcohol (PVA) by chemical oxidative polymerization is introduced. The PVA surface was successfully modified with conjugated polymers composed of 3-hexylthiophene (3HT) and fluorene (F). The incorporation of the 3HT/F copolymer onto the PVA surface was confirmed by Fourier-transform infrared (FT-IR), ultraviolet-visible (UV-vis), and fluorescence spectroscopies, X-ray diffraction (XRD), as well as thermogravimetric analysis (TGA), contact angle, and field-emission scanning electron microscopy (FE-SEM) coupled with energy dispersive X-ray (EDX) analysis. Different 3HT/F ratios on the PVA surface result in optical properties that include multicolor-emission and absorption behavior. The color of the resultant (3HT/F)-g-PVA shifted from red to blue, and the quantum yield increased with increasing F content. The surface hydrophobicity of the modified PVA increased significantly through grafting with the conjugated polymers, with the water contact angle increasing by 30° compared to pristine PVA. The PVA XRD peaks were less intense following surface modification. Thermogravimetric analyses reveal that the thermal stability of the PVA decreases as a result of grafting with the 3HT/F copolymers.