

Solid-State Luminescence of Fluorenone Grafted onto Cellulose Aldehyde Backbone Using Different Organic Amine Spacers

Authors : Isam M. Arafa, Mazin Y. Shatnawi, Yaser A. Yousef, Batool Zaid Al-Momani

Abstract : The present work describes the preparation, characterization, and luminescence of a series of fluorenone (FL) based luminophores grafted onto modified cellulose microfibers. The FL is condensed onto cellulose aldehyde using three diamine spacers ($\text{H}_2\text{N-NH}_2$, $\text{H}_2\text{N}(\text{CH}_2)_2\text{NH}_2$ and $\text{H}_2\text{N}(\text{CH}_2)_3\text{NH}_2$) to afford Cell=Spacer=FL. The obtained products were characterized by spectroscopic (FT-IR, UV-Vis), thermal gravimetric analysis (TGA), and microscopic (Optical, SEM) techniques. The UV-Vis spectra of the FL= $\text{N}(\text{CH}_2)_x\text{NH}_2$ ($x = 0, 2, 3$) moieties show that they are transparent in the 375- 800 nm region while they exhibit intense absorption band below 350 nm attributed to $n-\pi^*$ and $\pi-\pi^*$ transitions. The solid-state photoluminescence (PLs-s) of the cold-pressed pellets of the FL= $\text{N}(\text{CH}_2)_x\text{NH}_2$ and Cell=Spacer=FL placed in a quartz cuvette show strong emission in the 500-550 nm region upon irradiation with Xe lamp light ($\lambda_{\text{ex}} = 320$ nm). The PLs-s green emission of the grafted Cell=Spacer=FL was evaluated relative to that of the FL-based precursor. These grafted conjugated products have the potential to be used as analyte sensors for typical nitroaromatics/aromatic amines and be further extended to immunoassay studies for aromatic amino acids such as phenylalanine and histidine.

Keywords : luminescence, cellulose, fluorenone, grafting, solid state

Conference Title : ICBBM 2024 : International Conference on Biopolymers and Biodegradable Materials

Conference Location : Doha, Qatar

Conference Dates : March 18-19, 2024