Preparation of some compounds and study their thermal stability for use in dye sensitized solar cells

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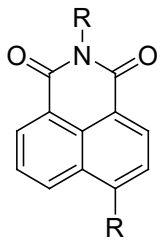
The present work aimed to prepare some compounds for use in pigmented solar cells based on charge transfer (CT) complexation. For this purpose, first, several derivatives of 1,8–naphthalimide and benzanthrone fluorescent dyes were synthesized. Secondly, the synthesized fluorescent dyes were bonded to picric acid (PA) acceptor via CT interaction in methanol solvent at room temperature. Then, the synthesized CT complexes were stoichiometrically, spectroscopically and thermally characterized. The results obtained from CHN elemental analyses and spectrophotometric titrations indicated the formation of CT complexes with a molar ratio of 1:1 between the PA and each dye. The spectroscopic and physical parameters (KCT,εmax, ECT, f, μ, RN, IP, and ΔG°), the band gap energy (Eg), and the kinetic–thermodynamic parameters (E*⁎,A, ΔS⁎, ΔH⁎ and ΔG⁎) were calculated for each CT product in methanol solvent at room temperature. IR results indicated that the complexation between each dye and PA acceptor occurs through $\pi \rightarrow \pi^*$ and proton transfer interactions.



R= different group

Recent Publications (minimum 5)

1. AL-Baradi, A.M., Al-Shehri, W.A., Badawi, A., Almalki, A.S. and Merazga, A., 2019. A study of the nanostructure and efficiency of solid-state dye-sensitized solar cells based on a conducting polymer. Heliyon, 5(4), p.e01472.

2. Almalki, A.S., Alhadhrami, A., Obaid, R.J., Alsharif, M.A., Adam, A.M.A., Grabchev, I. and Refat, M.S., 2018. Preparation of some compounds and study their thermal stability for use in dye sensitized solar cells. Journal of Molecular Liquids, 261, pp.565-582.

3. Almalki, A.S., Alhadhrami, A., Adam, A.M.A., Grabchev, I., Almeataq, M., Al-Humaidi, J.Y., Sharshar, T. and Refat, M.S., 2018. Preparation of elastic polymer slices have the semiconductors properties for use in solar cells as a source of new and renewable energy. Journal of Photochemistry and Photobiology A: Chemistry, 361, pp.76-85.

4. Refat, M.S., Elsabawy, K.M., Alhadhrami, A., Almalki, A.S., El-Sayed, M.Y. and Hassan, R.F., 2018. Development of medical drugs: Synthesis and in vitro bio-evaluations of nanomedicinal zinc–penicillins polymeric hydrogel membranes for wound skin dressing by new chemical technology. Journal of Molecular Liquids, 255, pp.462-470.

5. Almalki, A.S. and Refat, M.S., 2017. Synthesis and Photostability of 2-(4-isobutoxyphenyl)-6-Hydrazino-1, 8-Naphthalimide as Fluorescence Dye and Its Selenium Nanoscale Complex Doped in Polymethyl Methacrylate Polymeric Sheet Exposed to UV-Vis Radiation. Journal of Computational and Theoretical Nanoscience, 14(9), pp.4616-4623.

Biography

Dr. Abdulraheem Safar Ali Almalki received his master and Ph.D. degrees from the University of Sheffield (October 2011 – September 2015) in the field of polymer sciences more precisely in the field of solar cells. He subsequently returned to university of Taif, Faculty of Science, Department of Chemistry, KSA as an assistance professor. He was responsible for conducting fundamental research into polymeric materials these include conjugated polymers, composites material, nano-scale materials and hybrid polymers for organic electronics and biological applications. A.S.A. Almalki has many publications in peer-reviewed scientific journals. He is an expert in the trend of design, synthesis and exploitation of the unique physical properties of organic conjugated polymers for application in bulk-heterojunction (BHJ) solar cells and organic light-emitting diodes.

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