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Synthesis, Characterization, and Photoluminescence Study of Copolymer Derived From 2-Amino 6-nitrobenzothiozol and Oxamide with Formaldehyde

Punam G. Gupta[1], R. H. Gupta[2], W. B. Gurnule[1]
Department of Chemistry, Kamla Nehru Mahavidyalaya, Sakkardara, Nagpur, Maharashtra, India[1]
Department of Chemistry, K. Z. S. Science College, Kalmeshwar, Nagpur, Maharashtra, India[2,1]
punamgupta04@gmail.com[1] and wbgurnule@yahoo.co.in[1]

Abstract: *The current research article describes the synthesis of BOF-III copolymer from 2-amino 6-nitrobenzohiazole, oxamide, and formaldehyde used as a monomer in 3:1:5 molar ratios using polycondensation polymerization method in presence of 2M HCl as acid catalyst. The structure of the synthesized copolymer was characterized using elemental analysis and spectral techniques such as UV–Visible, FT-IR, and ^{1}H–NMR spectroscopy. The molecular weight of the copolymer was measured using a non-aqueous conductometric titration method. Scanning electron microscopy was used to investigate the surface morphology of a copolymer. The RF-501 (PC) S CE (LVD) MODEL PL spectrometer was used to evaluate the photoluminescence properties of newly synthesized copolymer. With significant input from current researchers in the field, the overall purpose of this development is to produce new polymeric material and analyze their photo luminescent properties.*

Keywords: Copolymer, Elemental Analysis, Spectroscopy, Photoluminescence

I. INTRODUCTION

Organic polymers are attractive materials for use as the active layer in optoelectronic devices including field-effect transistors (FETs) [1], light-emitting diodes (LEDs) [2], and photovoltaic cells[3], as well as in flexible displays[4]. solar panels[5], and smart materials [6].The majority of organic semiconductors are made up of π-conjugated molecules of various sizes, ranging from tiny molecules to polymers. The present challenge for the research world as well as industrial areas is to design innovative conjugated polymers with substantial optoelectronic capabilities [7].Conjugated polymers with a large π-conjugated structure have gained a lot of attention as multifunctional materials in recent decades because of their potential uses in chemical and biological devices [8] Copolymers containing π-conjugated bridges show significant promise as building blocks for carbon-rich networks, which could be useful in the creation of new optical materials and optoelectronic devices [9]. Because of their organic nature, they can be formed into flexible, lightweight materials that can be processed rapidly, making them ideal for low-power, low-cost applications[10]. Organic materials have several advantages over inorganic semiconductors, including inexpensive production and processing costs, flexibility, and light weight.

For full-color displays, high-efficiency red, green, and blue emissions are required [11]. Blue colour purity and consistency remain a challenge. However, compared to red or green emitting materials, blue emitting materials have major challenges with lower efficiency and shorter lifetime due to difficulties in hole and electron injection with greater band gaps [12]. Chemical and thermal stability of doped conjugated polymers are key concerns when evaluating possible long-term uses of organic conducting polymers [13]. Our ongoing exploration of several classes of π-conjugated polymers has been inspired by the promise of π-conjugated polymers as sophisticated materials for applications in electronics, optoelectronics, and nonlinear optics [14].One of the most intriguing features of organic materials is the able to develop a wide range of emission colour, notably in the blue region of EL displays, according to molecular design [15] [16].
Photoluminescence spectroscopy (PL) is a nondestructive, noncontact way of probing materials in which light energy or photons are passed through the sample, absorbed, and excess light energy is imparted into the sample. It is a strong approach for characterization and analysis of the electrical structure of intrinsic and extrinsic semiconducting and