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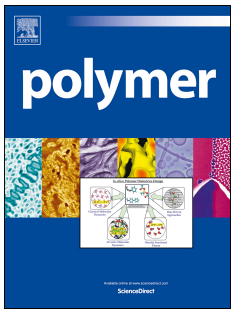

Synthesis and characterization of 1,2,3-triazole appended polythiophene based reusable fluorescent probes for the efficient detection of trace nitroaromatics

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Synthesis and characterization of 1,2,3-triazole appended polythiophene based reusable fluorescent probes for the efficient detection of trace nitroaromatics

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Abstract:

Emissive π-conjugated poly(3-benzyl-1,2,3-triazole thiophene) (**P1**) and poly(3-benzylthiophene) (**P2**) have been synthesized *via* Ni(II)-mediated Grignard metathesis (GRIM) polymerization from the corresponding monomers, 2-bromo-5-iodo-3-benzyl-1,2,3-triazole thiophene (**M2**) and 2,5-dibromo-3-benzyl thiophene (**M3**) respectively. The well-defined and soluble π-conjugated polymers have been characterized by multinuclear NMR spectra as well as by tetradetector GPC studies showing molecular weight (M_n) of 19.3 and 17.6 kDa with the polydispersity indices of 1.35 and 1.24 respectively. The synthesized π-conjugated polymers have been explored as fluorescent chemosensor for nitroaromatics (NACs). **P1** polymeric probe having 1,2,3-triazole appendage shows the superiority over **P2** towards the detection of picric acid vapor as manifested by the fluorescent quenching profile (89% and 41% respectively) due to the facile supramolecular interaction between *p*-type polymer and electron deficient NACs assisted by the polar 1,2,3-triazolyl unit. To understand the '*turn-off*' sensing mechanism though photo-induced electron transfer (PET), the detailed photophysical studies have been carried out Furthermore, test paper kits have also been fabricated, showing remarkable trace detection towards picric acid in nano-molar range by naked eye, making it a useful tool for a quick, easy and inexpensive way of detecting NAC explosives.

Introduction:

Nitro-rich compounds are essentially energetic materials used as explosives, and are also recognized as a toxic contaminants for environmental pollution [1]. The large scale use of explosives in the recent past has prompted the scientific community to develop novel sensing materials for rapid, sensitive and selective detection of explosives both in air, soil and water for national security and environmental concern [1a,2]. The explosive materials consist of an