Abstract Submitted
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Conjugated Polymer based sensor for detecting explosives such as RDX (1,3,5-Trinitroperhydro-1,3,5-triazine)[1] ABHISHEK KUMAR, Department of Physics, University of Massachusetts Lowell, ROBINSON ANANDKATHIR, Center for Advanced Materials, JAYANT KUMAR, Department of Physics — Conjugated polymers are an important class of materials and have attracted great scientific interests because of their unique optical and electrical properties. Synthesis of various conjugated polymers has been reported for detecting DNT and TNT. Here, for the first time, we report the synthesis and characterization of a conjugated polymer based on thiophene, Poly[2-(3-thienyl)ethanol *n*-butoxycarbonylmethylurethane] (PURET), for the detection of RDX via fluorescence quenching. The incorporation of judiciously chosen bulky butoxycarbonylmethyl urethane side group in the back bone of polythiophene reduces the aggregation, improves the solubility of the polymer in the organic solvents and quantum yield of fluorescence. We have observed a 15 % decrease of fluorescence in 60 sec in thin films of PURET exposed to the saturated vapor of RDX at room temperature. The large exciton diffusion length and interaction between side group and the quencher molecule are believed to be the reasons for enhanced RDX detection. Sensitivity below 5 parts per trillion (ppt) has been demonstrated for RDX at room temperature. The effect of nanostructures (electrospun nanofibers and stamped 1 D periodic pattern) on sensitivity and response time will also be discussed.

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