

1-5 NAPHTHALENEDISULPHONIC ACID DOPED POLYPYRROLE THIN FILMS AS COATINGS TO OPTICAL FIBERS FOR ORGANOPHOSPHATE SENSING

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Abstract- 1-5 Naphthalenedisulphonic acid (NDSA) doped polypyrrole thin films are prepared by chemical oxidation polymerization and applied as modified claddings to optical fibers for organophosphate (dimethyl-methyl phosphonate, DMMP) sensing. DMMP sensing takes place via intensity modulation in multimode fibers due to refractive index modulation in polypyrrole films due to DMMP adsorption. The polypyrrole films are characterized by FTIR and Raman spectroscopy. Ellipsometry and thin film transmission study is conducted to monitor refractive index modulation in polypyrrole thin films upon DMMP exposure. The developed fiber optic sensor shows a sensitivity of 134ppm towards DMMP. Influence of sensing element length, sensing element diameter and input light intensity on the sensor response is investigated. The selectivity, environmental and thermal stability issues are also addressed.

Index Terms: Conducting Polymer, Optical fiber Sensor, Polypyrrole, DMMP, Nerve agent, Evanescent wave sensing, chemo-chromic transducer.