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SYNTHESIS OF SPIRONAPHTHOXAZINE DERIVATIVE TO BE DEVELOPED AS A NOVEL SMART MATERIAL

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Smart materials also called intelligent materialsare capable of changingone or more of their properties in a precise manner upon external stimulifor instance temperature, stress, light, magnetic field, and pressure. Inherited smartness of these materials has opened up new pathways in many disciplines such as chemical industries, textile, pharmaceuticals, civil engineering, aerospace, etc.

Structure of the smart material contains trigger sensitive molecule/functional groupwhichbridge the connection between the smart material and the trigger.The molecule Spironaphthoxazine has been used as an excellent light sensitive moleculereversibly converts its hydrophobic nature to hydrophilic naturewith a clear color change. This research is ongoing work of developing such a smart materialusingSpironaphthoxazine and the work disclosed hereare the synthesis, purification and analysis ofSpironaphthoxazine derivative.We have identified 1,3,3-trimethyl- 9`-hydroxyspiroindolinenaphthoxazine molecule as a fatigue resistant, photoresponsive, and reversible Spironaphthoxazine.

Synthesis of 1,3,3-trimethyl-9`-hydroxyspiroindolinenaphthoxazine has been carried out using 2,7-Dihydroxynaphthalene as the precursor which undergo two steps to reach to the final product. Products of each steps has been characterized by melting points, Thin Layer Chromatography, IR and GC-MS spectroscopic methods. The product 1; 2,7-Dihidroxy-1-nitroso compound,has the melting point of 2850C, depicted IR peaks at naphtha OH (3141.25 cm-1), NO(3141.25 cm-1),C=C stretching (1558.62 cm-1- 1525.50 cm-1),C-H plane deformations (1145.78 cm-1- 1117.54cm-1),and C-H plane stretching (723.59 cm-1- 710.55 cm-1). Product 2; 1,3,3-trimethyl-9`- hydroxyindolinenaphthoxazine;IR spectrum depicted the peaks of naphtha OH(3399.88cm-1) , C-H(2922.53cm-1), spiro C=N (1623.65cm-1),Ph-N(1357.35cm-1) , spiro CO(1242.33cm-1) , and spiro COC=C(1031.53cm-1). The fragmentation of the MS spectrum are 344.3[M+], 329[M-CH3] +, 314[M-2CH3] +, and159.1, 131.0.

1,3,3-trimethyl-9`-hydroxyindolinenaphthoxazine was purified by Column Chromatography. Final yield of the product is 77.84%. Photoresponsive behavior of the synthesized Spironaphthoxazinederivative was studied using UV-Vis Spectra. UV spectra (CH2Cl2) show the peaks at lambda max 257 nm, 337 nm, and 512 nm.The synthesized photoresponsivechromophore has the ability torespond to light in a reversible manner.

Keywords: Smart materials/ Spironaphthoxazine/ photoresponsive /chromophore / reversible