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VISIBLE SPECTROSCOPIC CHARACTERIZATION OF LABORATORY PREPARED HYBRID ZINC SULPHATE WITH PHTHALOCYANINE DYE, PROPOSED IN SEMICONDUCTOR APPLICATION AS MICRO CAVITY POLARITONS

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ABSTRACT

Polaritons are hybrid particles made up of a photon strongly coupled to an electric dipole. Examples of such a dipole include an electron–hole pair in a semiconductor, which forms an exciton polariton. Photonic and electronic systems support many common universal phenomena. This research is based on the need of advanced material that are the main result brought by the chemical change. This research paper describes both theory and experiments, and deal with topics ranging from the synthesis of the material to check their properties. The unusual states that arise from coupling between light and the optical transitions in materials. This research Paper is mainly to reveal the modification of chemical properties of micro cavity polaritons using general laboratory practices to check their compatibility in semiconductor application. To give a wide range of material used for micro cavity polaritons for the semiconductor based devices.

***Keywords**: micro cavity Polaritons, materials etc.*

I. INTRODUCTION

The Main objective of this research paper is to observe and study of chemical properties laboratory prepared Hybrid Zinc Sulphate with Phthalocyanine dye applicable for advanced semiconductor as micro cavity polaritons among wide-bandgap semiconductors, ZnO is easily available material for preparing hybrid with too many organic material or dye at room temperature owing to its large exciton binding energy. Especially, ZnO-based microcavity structures are most conducive for polariton at room temperature. After preparation, Spectroscopic visible characterization of this hybrid material have been checked. These results are promising toward the realization of ZnO-based microcavitypolariton.

II. MATERIALS AND METHODS

Phthalocyanine dye is formed through the cyclotetramerization of various phthalic acid derivativesincluding phthalonitrile, diiminoisoindole, phthalic anhydride, and phthalimides. Alternatively, heating phthalic anhydride in the presence of urea yields Phthalocyanine dye.

10 gram Urea+13 gram Phthalic anhydride +5.5 gram $ZnSO_4$ + 1.5 gram Ammonium Molybdate + 55 ml Benzene+ Heating on 100 degree centigrade = Colour Changed into greenish blue. After cooling again added 40 ml Benzene. Heating on sand bath.

Solution prepared at various Dilution of $ZnSO_4$ with Phthalocyanine dye and Checked their transmittance and Optical Density in visible range using Photoelectric Colorimeter 112(Systronics)

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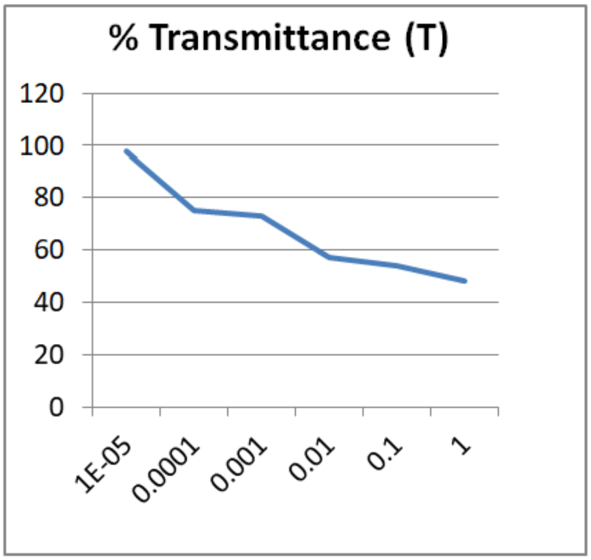
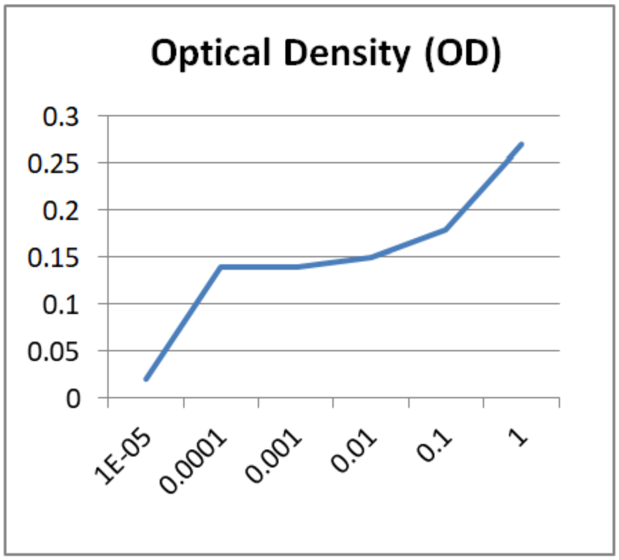
Observation Table

For Transmittance and Optical Density (Max. Wavelength= 480 nm)

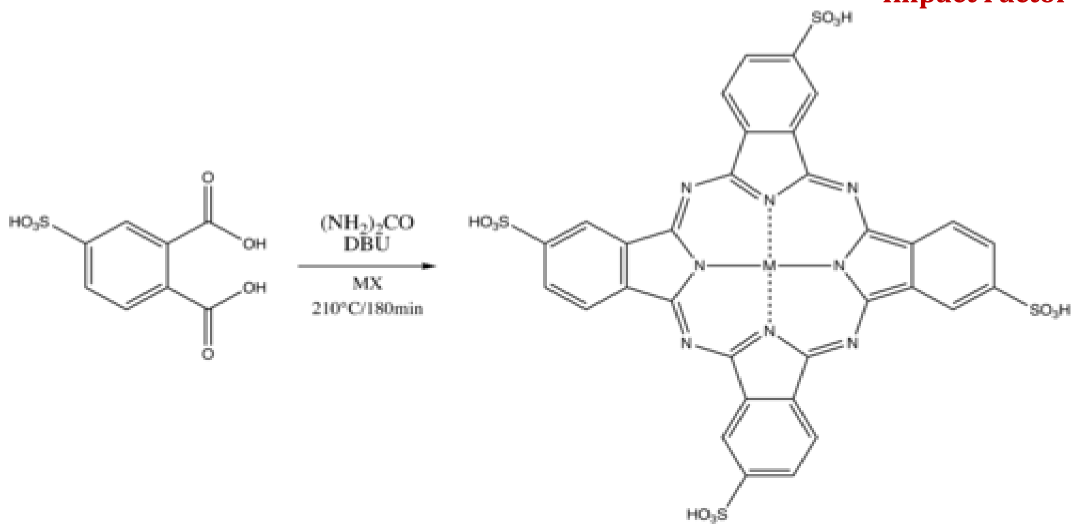
Concentration of ZnSO4 with Phthalocyanine dye in gm/lit	% Transmittance (T)	Optical Density (OD)
0.00001	98	0.02
0.0001	75	0.14
0.001	73	0.14
0.01	57	0.15
0.1	54	0.18
1.0	48	0.27





III. RESULTS AND DISCUSSION

Due to the greater research interest Phthalocyanine hybrid with zinc is synthesized. To prepare these complexes, the phthalocyanine synthesis is conducted in the solution of Zinc Sulphate in Benzene. The spectral properties of Zinc on and its complexes with phthalocyanine were investigated in vigorous conditions and various dilution in transmittance mode and optical density mode. These studies revealed the detection of metals to be generally attached with its binding sites with phthalocyanine. In addition, pH parameters noted for these metals indicated the optimal pH for complex formation.



At the initial level of research work, phthalocyanine was used primarily for only to study dyes and pigments[1,2,3,4,5]. Variation of the substituent attached to the peripheral rings allows for the tuning of the absorption and emission properties of phthalocyanine to yield differently colored dyes and pigments. There has since been significant research on this substituent resulting in a wide range of applications in areas including photovoltaic, photodynamic therapy, nano particle construction, and catalysis[6,7,8,9,10].The electrochemical properties of Hybrid zinc with phthalocyanine make them effective electron-donors and -acceptors. As a result, these materials have been developed for solar cells with power conversion efficiencies at or below 5% .[11,12, 13,14,15,16]

IV. CONCLUSIONS

This research is based on the need of advanced material that are the main result brought by the chemical change. Many recent research on advanced material used for semiconductors and their nanostructures exhibit many fascinating features that are attributable to their complex light matter coupling properties. Visible spectra of the Phthalocyanine-Zinc complexes exhibit characteristic of two bands, one in the visible region at 600–750 nm attributed to the π–π* transition from HOMO to the LUMO of the Phthalocyanine2− ring, and the other in the visible region at 300–400 nm,arising from the deeper π–π* transitions. It has been cross checked by plotting graph.In visible spectroscopic analysis, polaritoncharacteristic appear automatically by the graph plotted using observed values of transmittance and optical density against various concentration. The hybrid material Zinc-phthalocyanine being a collective mode in solids and superconducting circuits or an electron in atoms, molecules or even superconducting devices to denote the coupled light and polarization fields that form excitation in a semiconductor system. Furthermore, these hybrid materials have been used as catalysts for the oxidation of methane, phenols, alcohols, polysaccharides, and olefins.[17,18,19,20] Sample of Zinc Phthalocyanine,- Zinc Hybrid reveal the intense color characteristic of phthalocyanine derivatives.

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