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Measurement of Nonlinearity and Spectral Look at Of a Laser Dye

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Introduction

Speedy technological tendencies in optics have positioned awesome call for on the improvement of Nonlinear Optical (NLO) materials. The use of stable country dye lasers gets rid of a number of the common problems related to static or flowing liquid systems. The most regularly used polymeric fabric is polymethylmethacrylate. The low solubility of dye in PMMA causes obstacles that are triumph over by means of introducing modifying additives. An overview of literature showed that maximum of the paintings on dye-doped polymers has been achieved with Rhoda mine dyes and pyro methane dyes. Some works are said on coumarin dyes. The examine of nonlinear refractive index on dye IR140, has been suggested. No paintings have been mentioned at the study of nonlinear refractive index of the dye Victoria blue. The bodily origin of nonlinear refraction may be electronic, molecular, electrostrictive or thermal. Traditionally, the primary optical limiter turned into based totally on thermal mechanism with a cw laser. Currently, thermal consequences had been shown to be green regardless of nanosecond pulses. in this paper, we have studied the spectral characteristics and nonlinear properties of the dye Victoria blue in each the polymer and the corresponding monomer compositions in element.

Experimental technique

The laser dye, Victoria blue obtained from Exciton Inc., USA. turned into chosen for this look at. Thin layer chromatography (TLC) test confirms the absence of any impurities on this dye. Methyl Meth Acrylate (MMA) (Lancaster) was used as monomer. Preliminary MMA compositions had been cleared of foreign inclusions. Spectroscopic grade n-butyl acetate (nBA) bought from Merck (India) was selected as an additive as it combines precise solubility for Victoria blue dye. Synthesis of dye-doped polymer rod and movie the dye-doped polymer rod of dye attention 0.05×10^{-3} M changed into synthesized by way of thermal bulk unfastened radical polymerization method.

MMA and nBA have been taken within the ratio 4:1(v/v). Known weight of dye turned into dissolved in this mixture. 3 g of 2,2-azobis (isobutyronitrile) in step with litre of MMA answer became used as an initiator for polymerization. The solution changed into put into a polymerization tube and saved inside the nitrogen surroundings. Bulk polymerization changed into done in a temperature managed water bathtub and the temperature was maintained at 35°C for 2 days, at 40°C for any other 2 days and at 50°C for 7 days. The polymerized rod becomes removed by using breaking the glass tube. Rod (duration three cm: diameter 1cm) received, was cut, ground and polished to optical exceptional required. The internal optical features of polymer rod were checked via passing the He-Ne laser beam of 5mW via the rod. No dispersion or distortion of the He-Ne laser beam became determined. The dye doped polymer skinny film of attention 0.05×10^{-3} M become prepared by using pouring the viscous dye solution with initiator combination on to a tumbler slide positioned internal a tumbler enclosure, saved at a temperature of 40°C in temperature managed water tub. Spectral characteristics, quantum yield The spectral houses of the dye are studied by means of recording the absorption and fluorescence spectra of dye in MMA, in nBA, in a aggregate of MMA and nBA (liquid medium) and within the solid matrix (PMMA modified with nBA) the usage of Hitachi U2000 spectrophotometer and Hitachi F2000 spectrofluorometer respectively. The fluorescence spectra had been corrected the use of quinine sulphate in zero.1N H_2SO_4 and fluorescein in zero.1N NaOH. Care turned into taken to record all spectra under equal conditions. These spectra are shown in Figures 1 and a couple of. Quantum yields have been calculated the usage of Rhodamine 6G (Rh 6G) in ethanol because the fluorescence well known with refractive index and differential absorption correction.