

Effect of Medium Acidity and Photostability of 3-(4-Dimethylamino-phenyl)-1-(2,5-dimethyl-thiophen-3-yl)-propenone (DDTP): A New Green Emitting Laser Dye

El-Daly, Samy A.^{*,a,b} Asiri, Abdullah M.^{a,c} Khan, Salman A.^a Alamry, Khalid A.^a
Hussein, Mahmoud A.^{a,d}

^a Chemistry Department, Faculty of Science, King Abdulaziz University, P.O. Box 80203, Jeddah 21589, Saudi Arabia

^b Department of Chemistry, Faculty of Science, Tanta University, 31527 Tanta, Egypt

^c The Center of Excellence for Advanced Materials, King Abdul Aziz University, Jeddah 21589, P.O. Box 80203, Saudi Arabia

^d Polymer Chemistry Lab, Chemistry Department, Faculty of Science, Assiut University, Assiut, 71516, Egypt

On the line of a previous work on the spectral properties of some of heteroaryl chalcone, the effect of medium acidity and photoreactivity of 3-(4-dimethylamino-phenyl)-1-(2,5-dimethyl-thiophen-3-yl)-propenone (DDTP) has been investigated in dimethylformamide and in chloromethane solvents such as methylenechloride, chloroform and carbon tetrachloride. The dye solution (*ca.* 5×10^{-4} mol·L⁻¹ in DMF) gives a good laser emission in the range 470–560 nm with emission maximum at 515 nm upon pumping by nitrogen laser ($\lambda_{\text{ex}} = 337.1$ nm). The laser parameters such as gain coefficient (α), emission cross section (σ_e) and half life energy ($E_{1/2}$) at maximum laser emission are also determined.

Keywords 3-(4-dimethylamino-phenyl)-1-(2,5-dimethyl-thiophen-3-yl)-propenone, laser dyes, effect of acidity, possibility

Introduction

Chalcone derivatives have been reported earlier as important probes of medium viscosity.¹ This property is particularly important in assessing the microenvironments in micelles, microemulsions and vesicles.² Chalcones are known as physiological active substances produced within tissues that appear to control the mitosis of the cell of specific tissues that produce them.³ Hetero-aryl chalcone derivatives have several applications in many areas such as in food industry,⁴ fluorescent probes for sensing DNA⁵ and photoreactive polymers.⁶ Also, chalcones have been used for numerous optical applications including photo-alignment layer of liquid crystal display.⁷ Therefore, the photophysical properties of chalcones containing alkyl amino group as electron donor have been studied.^{8–11}

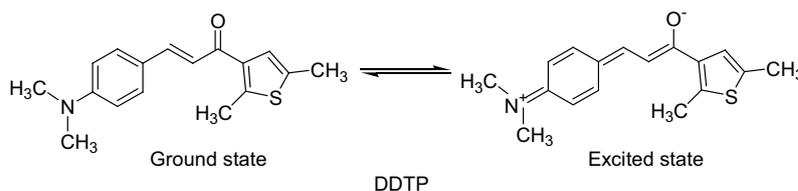
In earlier studies^{12–14} we reported the photophysical

and laser emission from some aryl chalcones derivatives. This paper represents a continuation of our systematic studies of donor-acceptor aromatic derivatives separated by ethenyl bridge.

We reported, the laser activity of another chalcone derivative namely 3-(4-dimethylamino-phenyl)-1-(2,5-dimethyl-thiophen-3-yl)-propenone (DDTP).

Experimental

DDTP was synthesized and purified as described previously^{15,16} and its purity was confirmed by elemental analysis and ¹H NMR and ¹³C NMR. All solvents used were of spectroscopic grade and were preliminarily checked for the absence of absorbing or fluorescent impurities within the scanned spectral ranges. UV-visible electronic absorption spectra were recorded on Shimadzu UV-160A spectrophotometer with band-pass of



* E-mail: samyeldaly@yahoo.com

Received June 19, 2011; revised August 10, 2011; accepted August 25, 2011.