Fourth International Youth Conference on Organic Synthesis

June 27-30, 2005
St. Petersburg, Russia

MODERN TRENDS IN ORGANIC SYNTHESIS AND PROBLEMS OF CHEMICAL EDUCATION

ABSTRACTS

St. Petersburg
2005

Четвертая международная конференция молодых ученых по органической химии

27-30 июня, 2005 г.
Санкт-Петербург, Россия

СОВРЕМЕННЫЕ ТЕНДЕНЦИИ В ОРГАНИЧЕСКОМ СИНТЕЗЕ И ПРОБЛЕМЫ ХИМИЧЕСКОГО ОБРАЗОВАНИЯ

МАТЕРИАЛЫ КОНФЕРЕНЦИИ

Санкт-Петербург
2005

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Конференция проводится при финансовой поддержке:
Российского фонда фундаментальных исследований (грант № 05-03-42030)
ОАО «Морская арктическая геологоразведочная экспедиция» (ОАО МАГЭ)
ЗАО «Невский капитал»
АО «Экрос»
ООО «Астрохим»
Федеральный научно-производственный центр Санкт-Петербургский завод «ГОСМЕТР»

ISBN S–93852–004–5

Подписано к печати 27.05.2005. Сдано в производство 30.05.2005.
Формат бумаги 84X120 1/16. Бумага офсетная. Печать ризографическая.
Объем 25,25 п.л. Тираж 300 экз. Заказ № 53487.

Издательство ЗАО «Строка»
Отпечатано в типографии ООО «Уни-Принт»,
191119, г. Санкт-Петербург, ул. Достоевского, 44

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CONTENTS

DYNAMICS OF FLUORESCENCE DYES, DIPHENYLHEXATRIENE AND POLYTIOPHENS, IN FREE AND CONFINED FORMS*

Peter Chandoga[a,c], Jozef Kuruc[b], Ignác Bugár[c],, Dusan Velic[a,c], Dušan Chorvát[c]

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A development of laser technology pushed the limits of time-resolved techniques dealing with dynamics of chemical interaction. Observation of a chemical reaction in real time [1] started a wide spreading use of time-resolved experiments in all branches of chemistry. Those experiments span from a solvation dynamics [2], to excited electron relaxation on solid metallic surfaces [3]. Our experiment focuses on dynamic of fluorescence as a function of interactions between solute and solvent. The main relaxation channel of this process is the interaction between charge distribution of solute and dipoles of solvent molecules. The result of this interaction is reorientation of solvent, a consequence of dielectric response as a measure of dipoles reorientation. The involved processes are internal relaxation, interaction with the environment and the fluorescence itself. The fastest process is the internal conversion and just this aspect of fluorescence dynamics is possible to measure with an experimental set-up providing picosecond time resolution.

The studied subjects of our experiments are organic dyes based on 1,6-diphenyl-1,3,5-hexatriene (DPH) and polytiophens. The interconversion rates between the two states determine the average lifetime [4]. For DPH in solvents, the lifetimes of fluorescence are solvent dependent. Relaxation of fluorescence measured at different wavelenghts is shown in Fig.1., for acetone. It describes different electronic energetic and vibrational states.

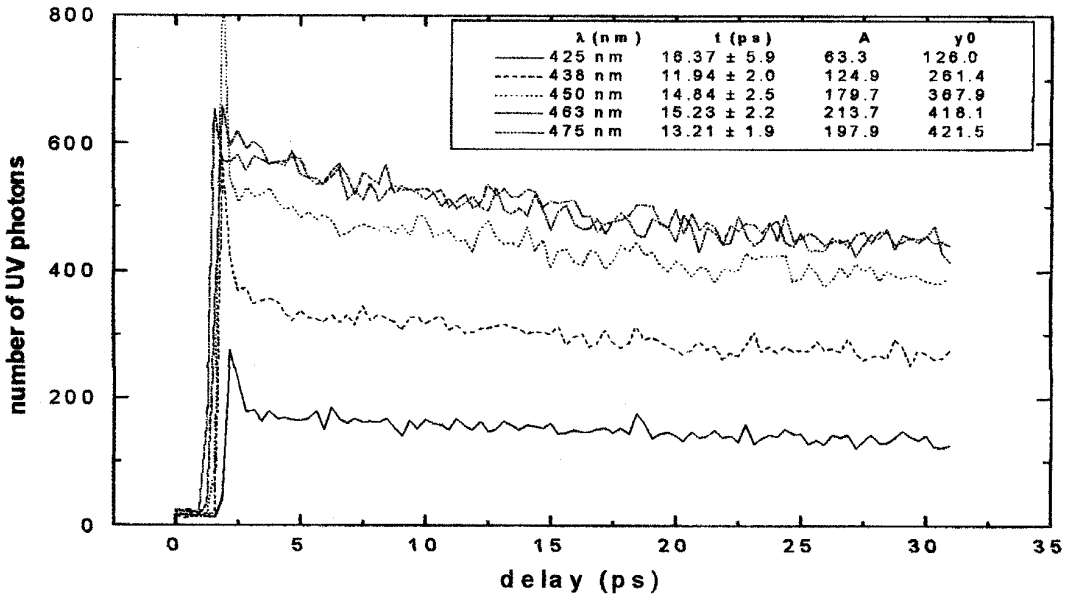

Figure 1

Fluorescence intensity in up-converted UV photons of DPH in acetone at different wavelenghts

* VEGA grant 1/0216/03 is appreciated.

Fig.1. shows spectra and mono-exponential fit parameters. The excitation and fluorescence spectra of DPH were measured in ethanol, methanol, acetone and *n*-hexane. The static fluorescence spectra were measured with Fluorog 3.11 system. The wavelength maxima of the DPH structure are 400, 423 and 451 nm, 402, 424 and 450 nm, 404, 426 and 452 nm, and 402, 425 and 450 nm in ethanol, methanol, acetone, and n-hexane, respectively. The intensity of fluorescence changes with the concentration as follows. The solutions of ethanol, methanol, acetone, and n-hexane were measured in the concentration range from $5x10^{-4}$ to 10^{-6} M and their intensities decreased from 716000 to 57000 photons s^{-1}, 341000 to 70500 photons s^{-1}, 380000 to 28500 photons s^{-1}, and 166000 to 17000 photons s^{-1}, respectively. Dynamics of DPH seems to be independent on the wavelenght in accord with static spectra provided minimal Stokes shifts.

The fluorescence relaxation dynamics was investigated by using femtosecond time-resolved fluorescence. The applied technique is based on up-conversion of the fluorescence signal with the delayed probing signal. The fundamental pulse used both for the fluorescence excitation (doubled before) and the probing, are generated from the Ti-sapphire oscillator. The time resolution of this technique is approximately 100 fs.

The time-resolved fluorescence dynamics of polytiophen was also investigated. Fig.2. shows spectra and double-exponential fit parameters of polytiophens in chlorophorm.

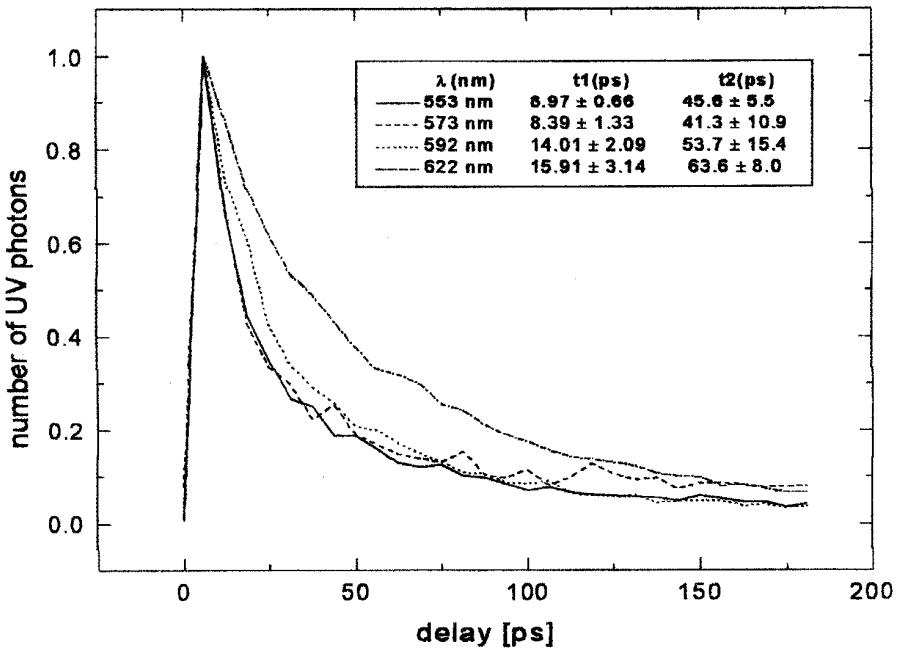

Figure 2

Fluorescence intensity in up-converted UV photons of the polytiophen in chlorophorm at different wavelenghts

Dynamics of polytiophens seems to be dependent on the wavelength. The shorter wavelength results in shorter relaxation time, due fast intramolecular process. The longer wavelength results in the longest relaxation time due to stabilization on the ground vibrational state.

[1] A. H. Zewail, *Femtochemistry- Ultrafast Dynamics of the Chemical Bond.* Volume I, World Scientific Publishing Co., Inc. New Jersey. **1994**.
[2] M. L. Horng, J.A. Gardecki, A. Papazyan, M. Maroncelli, *J. Phys. Chem.*, **1995**, *99*, 17311.
[3] D. Velic, A. Hotzel, M. Wolf, G. Ertl, *J. Chem. Phys.*, **1998**, *109*, 9155.
[4] Parasassi T., Destasio G., Rusch R.M., Gratton E., *Biophys. J.*, **1991**, *59*, 466.