

Accepted Manuscript

Research paper

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PII: S0009-2614(17)30708-X

DOI: <http://dx.doi.org/10.1016/j.cplett.2017.07.039>

Reference: CPLETT 34965

To appear in: *Chemical Physics Letters*

Received Date: 28 May 2017

Accepted Date: 17 July 2017

Please cite this article as: C-W. Chang, T.I. Sølling, E. Wei-Guang Diau, Revisiting the photophysics of 9-fluorenone: Ultrafast time-resolved fluorescence and theoretical studies, *Chemical Physics Letters* (2017), doi: <http://dx.doi.org/10.1016/j.cplett.2017.07.039>

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Revisiting the photophysics of 9-fluorenone: Ultrafast time-resolved fluorescence and theoretical studies

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Abstract

Ultrafast intersystem crossing dynamics of fluorenone in gas and condensed phases were investigated by time-resolved mass spectrometry and fluorescence up-conversion spectroscopy. The former shows the ultrafast Franck-Condon relaxation and the internal conversion dynamics of isolated fluorenone in the gas phase. The latter reveals that the vibrational relaxation time is 2.2 ps and a 110 ps fluorescence lifetime of fluorenone in hexane. The fluorescence lifetime in acetonitrile and dimethylsulfoxide is 16 ns and 15.1 ns, respectively. The potential energy surface along the C=O out of plane bending motion shows that this coordinate is important for ISC in both polar and non-polar solvents.

Keywords: fluorenone; time-resolved mass spectroscopy; time-resolved fluorescence spectroscopy; intersystem crossing;

Introduction

Understanding the factors that affect the deactivation rate of an excited molecule is key to studies

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