

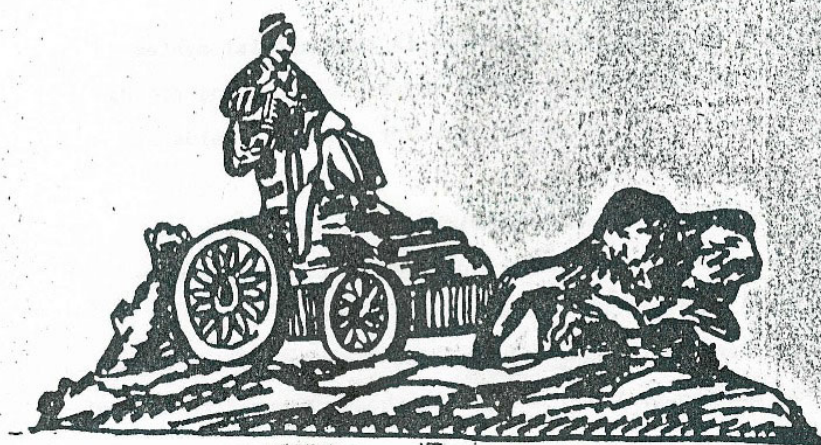


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ABSTRACTS

PICOSECOND FLUORESCENCE DECAYS FROM ELECTRONIC EXCITED STATES OF
2,2'-BIPYRIDINE SOLUTIONS.

L. Angeloni and E. Castellucci

Department of Chemistry, University of Florence, Italy

In a previous paper /1/ the fluorescence spectra of 2,2'-bipyridine solutions in different solvents and concentrations have been discussed in terms of isolated and associated molecules. It was concluded that at higher concentrations there are at least two different radiative decay routes for 2,2'-bipyridine, related to planar isolated molecules and to dimers, respectively.

The present research deals with the measurements of the emission decays of different solutions of 2,2'-bipyridine ranging from 10^{-1} M to 10^{-7} M using the time-correlated single-photon-counting technique.

As an excitation pulse light source we used a synchronously pumped dye laser which is operated with a mode-locked Ar^+ laser. Frequency doubled UV pulses (pulse duration ≈ 7 ps, $\lambda_{\text{exc}} = 290$ nm) were generated in a KDP crystal. A microchannel plate photomultiplier was used which allowed us to obtain an instrument response function with 170 ps width.

The fluorescence emission collected at $\lambda_{\text{em}} = 397$ nm, $\Delta\lambda = 10$ nm, shows a decay which is best fitted with a single exponential function ($\tau \approx 1.3$ ns) for concentrations up to 10^{-5} M in cyclohexane. From this concentration the decays could no longer be fitted with single exponentials. A much faster decay appears and largely predominates at the higher concentration attained, i.e., 10^{-1} M. The timewidth of this fast decay is within the instrument response shape. Spectra taken within a time window shifted at longer time of the emission decay curves showed similar to those obtained at low concentration. The total spectra at high concentrations show new features due to species other than the monomer molecules.

References

- /1/ A. Agresti, M. Bacci, E. Castellucci and P. R. Salvi,
Chem. Phys. Letters, 89 (1982) 324.