

Intermolecular Dynamics and Exciplex Formation of van der Waals Complexes

メタデータ	言語: jpn 出版者: 公開日: 2022-11-10 キーワード (Ja): キーワード (En): 作成者: Itoh, Michiya メールアドレス: 所属:
URL	https://doi.org/10.24517/00067932

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 International License.



1987 Fiscal Year Final Research Report Summary

Intermolecular Dynamics and Exciplex Formation of van der Waals Complexes

Research Project

Project/Area Number

61470004

Research Category

Grant-in-Aid for General Scientific Research (B)

Allocation Type

Single-year Grants

Research Field

物理化学一般

Research Institution

Kanazawa University

Principal Investigator

ITOH Michiya Faculty of Pharmaceutical Sciences, Kanazawa University, Professor, 薬学部, 教授 (30012610)

Project Period (FY)

1986 - 1987

Keywords

van der Waals complex / Supersonic jet / Exciplex / Excimer / Fluorescence / Transformation of van der Waals complex to Exciplex

Research Abstract

1. The exciplex formation dynamics of the 1-cyanonaphthalene/triethylamine van der Waals complex upon excitation has been examined under collision free condition. Mode-specificity has been found in the excitation of a combination band between intra- and intermolecular vibrational modes in the S₁ state of the vdW complex to promote the exciplex formation reaction.

The fluorescence decays of the S₁ and exciplex states have been measured as a function of excess energy above the S₁ origin. The observed decay rate constants have been discussed using a simple kinetic model.

2. Upon excitation of the van der Waals dimer and heterodimer of fluorene and 9-ethylfluorene generated in a supersonic expansion, the excimer and exciplex fluorescence spectra and decay times were obtained. The spectral maximum and decay time of the exciplex are almost intermediate between two excimers of fluorene and 9-ethylfluorene. The transformation of vdW heterodimer to the exciplex takes place from the excited state of the heterodimer corresponding to the locally excited state of 9-ethylfluorene.


3. Two types of van der Waals complexes between 1-cyano-4-methylnaphthalene and triethylamine were observed in the supersonic free jet. Upon excitation of nearly origin bands of these complexes, the dispersed exciplex fluorescence was observed from one of the complexes, while no significant exciplex fluorescence was detected from the other complex. However, the fluorescence excitation spectra demonstrate that the transformation to the exciplex


proceeds in the excitation to the upper vibrational state of these complexes. The exciplex formation from the vdW complex was also indicated by the determination of fluorescence decay times of these jet cooled species.


Research Products (6 results)


All Other


All Publications (6 results)


[Publications] H. Saigusa;M. Itoh;M. Baba;I. Hanazaki: Journal of Chemical Physics. 86. 2588-2596 (1987) 

[Publications] M.Itoh;M. Sasaki: Journal of Physical Chemistry. (1988) 

[Publications] M. Itoh;Y. Morita;H. Saigusa: Journal of Physical Chemistry. (1988) 

[Publications] H. Saigusa, M. Itoh, M. Baba, I. Hanazaki: "Intermolecular Dynamics and Exciplex Formation of the 1-Cyanonaphthalene/Triethylamine van der Waals Complex" Journal of Chemical Physics. 86. 2588-2596 (1987) 

[Publications] M. Itoh, M. Sasaki: "Transformation of van der Waals Complex to the Exciplex in Jet Cooled 1-Cyano-4-methylnaphthalene and Triethylamine" Journal of Physical Chemistry. 

[Publications] M. Itoh, Y. Morita, H. Saigusa: "Transformation of van der Waals Complexes to Excimer and Exciplex in Jet Cooled Fluorene and 9-Ethylfluorene" Journal of Physical Chemistry. 

URL: https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-61470004/614700041987kenkyu_seika_hokoku_

Published: 1989-03-29