

Picosecond laser chemistry in molecular beams (Invited paper)

A. H. Zewail

(Arthur Amos Noyes Laboratory of Chemical Physics, California Institute of Technology, Pasadena, California, 91125, USA)

In this talk, we will describe the technique of picosecond-jet spectroscopy where a picosecond laser excites molecules under supersonic beam conditions. The large molecules studied are vibrationally and rotationally cold ($\sim 10\text{K}$ and $\sim 1\text{K}$, respectively), and exhibit, following the laser excitation, vibrational energy redistribution or undergo photochemistry. Specific molecular systems showing the energy redistribution in the excited state or undergoing isomerization or solvation will be discussed. The experimental findings will be related to statistical theories of unimolecular rate processes.

分子束中的微微秒激光化学

A. H. Zewail

(美国加利福尼亚理工学院阿瑟·阿莫斯诺伊化学物理实验室)

本文评述了在超声射流条件下用微微秒激光激发分子的微微秒射流光谱术。所研究的大分子为振-转冷却(分别为 10K 及 1K), 经激光激发之后, 呈现振动能量的重新分布或光化学反应。对在激发态下呈现能量再分配或起同分异构化或溶剂化反应的这种特殊的分子系统进行了讨论。实验结果与单一分子速率过程的统计理论有关。