High resolution laser spectroscopy of insulators

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The advent of tunable laser spectroscopy has allowed us to investigate optical properties in the condensed phases with unprecedented resolution both in the frequency and temporal domains. These experimental techniques will be reviewed briefly as will various static spectroscopic features which have been identified through the suppression of inhomogeneous features. Dynamic properties of the optically excited state as derived through time resolved fluorescence line narrowing (FLN) will be emphasized. These results have led to new insights and understanding of the microscopic and macroscopic interactions governing energy transfer and diffusion in solids. Relevance of these results to the more general problem of energy propagation in amorphous solids will be discussed. Finally, we review recent extensions of laser spectroscopic studies to the infrared and ultraviolet region using F center lasers and two photon spectroscopy respectively.

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绝缘体的高分辨率激光光谱学

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可调谐激光光谱学的出现，使得我们在频率域或时间域上都可以对凝聚相的光学性质进行前所未有的高分辨研究。本文简单地评述了这些实验技术以及各种静态光谱特性，这些特性通过抑制非均匀性质已被验证。我们强调通过时间分辨的荧光谱线变窄（FLN）而推论出的光激发态的动力学性质。这些性质可使我们对决定固体中能量转移与扩散的微观与宏观的相互作用有新的认识与理解。本文还讨论了这些结果与无定形固体中更为一般的能量传播的关系。最后，我们分别评述了利用色心激光器和双光子光谱术把激光光谱术推广到红外和紫外区域的近况。