HIGH-RESOLUTION LASER SPECTROSCOPIC STUDIES OF CINNAMATE-BASED MOLECULAR HEATERS

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Food security is one of the major challenges society is currently facing. One of the approaches to meet this challenge is to use molecular light-to-heat converters to extend the growth season and to allow utilization of geographical locations that are currently not suitable. Cinnamates -chromophores used already in nature as sunscreens against damage by UV radiation - from in this respect an attractive starting point for the development of such 'molecular heaters'. Here we report molecular beam studies on judiciously substituted cinnamates in which we study their spectroscopy and excited-state dynamics using Resonance Enhanced MultiPhoton Ionization (REMPI) spectroscopic methods focussing in particular on how substitutions affect their photophysics and photochemistry. One particularly interesting aspect of these studies is the use of Velocity Map Imaging (VMI) electron detection which allows us to study in much more detail than before the properties of the initially excited state as well as energy dissipation pathways involving 'dark' electronically excited states. In combination with advanced quantum chemical calculations, a comprehensive view is obtained of how photon energy is converted into heat, and how these pathways might be optimized.