

Dynamics of photoexcited electrons at surface of rutile TiO₂

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Photoexcited electron dynamics provides the key of understanding the behavior of TiO₂ in photochemistry. In our previous work, the dynamics of localized electrons excited by 800 nm infra and band electrons by 350 nm ultraviolet (UV) radiations have been investigated using pump-probe electron spectroscopy, which surprisingly show a similar behavior in ultrafast time scale below 100 fs [1]. To further understand the dynamics of photoexcited electrons, we finely tuned the wavelength of UV radiations and investigated the electron dynamics using two-color two-photon photoelectron spectroscopy. Our work shows that the electron dynamics varies noticeably with respect to the excitation UV wavelength, which can be understood from the conduction band structure of TiO₂. Together with the study of the band structure changes using ultraviolet photoemission spectroscopy, our work contributes a comprehensive knowledge about the relation of electron dynamics and band structure at surface of TiO₂.

- [1] Y. Zhang, D. T. Payne, C. L. Pang, C. Cacho, R. T. Chapman, Emma Springate, H. H. Fielding, and G. Thornton, *J. Phys. Chem. Lett.* 10, 5265 (2019).