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Direct monitoring of photo-induced reactions on well-defined metal oxide surfaces using vibrational spectroscopy

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ABSTRACT

Reflection–absorption infra red spectroscopy (RAIRS) has been successfully used to study a prototype photochemical reaction: the photooxidation of CO over rutile TiO₂(110) single crystal surfaces. RAIRS-results revealed the presence of irreversibly adsorbed CO on top of the five fold coordinated surface Ti atoms with a vibration frequency of 2190 cm⁻¹ at 110 K. Because fundamental problems have so far prohibited the detection of CO on metal oxide single crystals with IR-spectroscopy (in contrast to the situation for powders), high resolution electron energy loss spectroscopy (HREELS) was also employed for further confirmation.