

## Structure and Photocatalytic Activity of Semiconducting Oxide Surfaces

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The photocatalysis on semiconductor oxide surfaces has recently received enormous attention because of the promising applications in the fields of solar energy conversion, water splitting, environmental treatments, etc. In spite of extensive studies, major issues concerning the photoactivity of many metal oxides (e.g., TiO<sub>2</sub> and ZnO) are still under debate. In principle, fundamental questions about surface photochemistry at oxide surfaces could be addressed using a surface science approach with well-defined model systems. However, experimental data on metal oxide single crystal surfaces, which would also provide the basis for a more thorough theoretical understanding, are very scarce. This unfortunate lack of information results from fundamental technical problems. Here we briefly present our recent vibrational spectroscopic studies on selected model reactions at various metal oxide surfaces. Detailed insight has been obtained into the structure and photocatalytic activity of pure and doped ZnO and TiO<sub>2</sub> surfaces by using high-resolution electron energy loss spectroscopy and ultrahigh vacuum FTIR spectroscopy.