# Vortragsankündigung

**Mittwoch, 9. Jänner 2019, 17 Uhr**

Seminarraum I (JAK2AOG1.33), Jakob-Haringer-Straße 2a

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## “Charge Carriers in Commercial Photocatalysts: Fractal Kinetics and Effect of “Inert” Additives”

Charge carrier recombination kinetics of commercial $TiO_2$ powder samples were analyzed in the time domain ranging from 50 ns to 1 ms. Transient reflectance signals of the charge carriers observed by laser flash photolysis spectroscopy do not fit to simple second order kinetics as expected for the recombination of trapped electrons and holes. The deviation from second order reaction dynamics can rather be explained by the segregation of charge carriers and the fractal dimension of the semiconductor agglomerates.

The effects of particle size distribution on the charge carrier dynamics and the photocatalytic activity of mixed titanium dioxide ($TiO_2$) powder samples were investigated. Binary particle size distributions of the powders were obtained by mixing commercially available $TiO_2$ powders with different particle sizes. The photocatalytic NO degradation increased for samples containing larger amounts of small particles. The corresponding photonic efficiencies correlated well with the charge carrier lifetimes determined by the time-resolved studies. Hence, it was concluded that a long charge carrier lifetime generally leads to higher fractional conversions of NO. The employed fractal fit function was proved to be beneficial for the kinetic analysis of charge carrier recombination in $TiO_2$, in direct comparison with a second order fit function.

Building materials employing $TiO_2$ as photocatalyst usually contain several additives. The interplay of the additives and the photocatalytic NO degradation has been rarely investigated, although it is of utmost importance for the design of new highly active materials. In the talk effects of such additives ($BaSO_4$, $CaCO_3$, and $Na_2CO_3$) on the photocatalytic activity and on the charge carrier dynamics will be discussed.