LATERALLY-RESOLVED KINETICS OF CATALYTIC CO OXIDATION: FROM MESOSCOPIC TO NANO-SCALE

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Despite significant efforts, theoretical calculations do not yet provide the entire prediction for practically useful catalysts, therefore high-throughput screening of commercial catalysts and experimental studying of model-systems are exploited intensively to date. To describe the behavior of a heterogeneous model system, laterally-resolved studies of reaction kinetics are necessary. However, the experimental kinetic studies are mainly performed by mass spectroscopy (MS) and suffer from spatial averaging over the whole sample surface. In turn, modern surface imaging microscopies such as PEEM, LEEM, MIEEM, FIM/FEM, provide with their parallel imaging principle the laterally-resolved information from the entire sample surface.

It appears that in addition to the "visual" information about the spatial pattern formation [1], reaction front propagation [1,2], reaction-induced morphology changes [3] also the reaction kinetics can be extracted from microscopic imaging. Recently, it was demonstrated for the first time that information about *local reaction kinetics* for individual μm-sized grains of a polycrystalline Pt foil can be obtained by PEEM [4]. By processing the video-PEEM data obtained during catalytic CO oxidation, the kinetic phase diagrams for the individual differently oriented domains were constructed. Using FIM/FEM, such local kinetic information can be obtained for the differently oriented nm-sized facets on the apex of a nano-tip serving as a model of an individual catalytic particle [5].

The perspectives of different surface microscopies and spectroscopies in the μm and nm scales for kinetic studies on different model systems will be discussed.

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