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State kinetics of the oxidation of MoO₂ investigated by time-resolved X-ray absorption spectroscopy

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Abstract:

The isothermal oxidation of MoO2 in oxygen (100%) at temperatures between 623 K and 823 K is studied by time-resolved in situ X-ray absorption spectroscopy. Four rate-determining steps (i.e. mass transport, boundary control, nuclei growth, and diffusion) dependent on temperature and the extent of reaction are found to govern the rapid oxidation of MoO2. The XANES and EXAFS results presented show that time-resolved XAFS studies can be used to investigate rapid solid-state reactions and to elucidate kinetics and structural evolution of the constituent phases.

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