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Avrami kinetics of oxide film decomposition on Si(100) IKUYA KINEFUCHI, The University of Tokyo, HIROKI YAMAGUCHI, Nagoya University, YUKINORI SAKIYAMA, UC Berkeley, SHU TAKAGI, The University of Tokyo / Riken, YOICHIRO MATSUMOTO, The University of Tokyo — The thermal decomposition of ultrathin oxide layers on silicon surface was investigated with TPD technique. Oxide layers were formed on Si(100) at 400°C by exposure to O_2 molecular beam. The desorption spectrum of SiO for the initial coverages between 1.7 and 2.6 monolayers exhibits a relatively low peak at the lower temperature and a high peak at the higher temperature. The former peak corresponds to the unstable binding state, where O atoms are presumably trapped at the dangling bonds. The latter corresponds to the more stable binding states of O atoms at the dimer bridge sites and the dimer backbond sites. The most of O atoms are at the stable binding states, from which the desorption rate is well described by Avrami kinetics. This result is consistent with the reaction model which takes account of the void formation and growth as observed in STM studies. The rate-determining step is the reaction at void perimeter even if the overlap between voids becomes quite large. The Avrami exponents determined from our experiment suggest that the increase in the initial coverage makes the oxide adlayer more stable and suppresses the rate of void nucleation at the potential nucleation sites.

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