The Oxidation Kinetics of Thin Copper Films Studied by Resistivity Measurements

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Resistivity measurements on thin metal films allow to study the kinetics of oxidation. The method is applied to 50 - 60 nm thick copper films deposited on glass substrates under UHV conditions. After annealing at 150 °C, the films are exposed to pure oxygen at various temperatures in the range 85 - 135 °C, and the electrical resistivity is recorded in situ. At these temperatures, the oxygen begins to penetrate into the interior of the films, which results in a relatively steep increase in the film resistivity. A linear time law is valid to good approximation, which can be attributed to the influence of the dissociation of an adsorbed molecular species of oxygen on the reaction velocity. A potential diffusion of oxygen in the grain boundaries is also discussed.

Key words: Oxidation; Kinetics; Resistivity; Thin Metal Films.

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