The Non-Protective Oxidation of Copper at Low Temperatures - J. Castle (University of Surrey)

Copper is associated with protective oxidation according to a parabolic rate law. It was the metal used by Wagner to compare experiment and models of oxidation and by Mott and Cabrera in their studies of thin film oxidation. Yet, there are instances found in both laboratory and in the field in which it oxidises at a rate which is large compared with that anticipated from solid state processes. In this paper a history of work, by the Author, on the low-temperature (<300C) non-protective oxidation of copper and its alloys, extending over 40years in laboratory is reviewed. Oxidation in several types of atmosphere will be reported, including: steam/oxygen; thermally dissociated oxygen; oxygen/hydrogen sulphide; and oil/oxygen. Much of the data is previously unpublished and thus ideally suited to retrospective review. An attempt is made to see a common mechanism in these disparate environments.