

The interaction of titanium films with oxygen over a wide range of pressures and exposures

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Abstract

The interaction of titanium films with oxygen has been studied by observing their change of resistance R and workfunction ϕ over the range of gas pressures from UHV to 5 Torr and exposures from 0- 10^6 Torr s. The changes in R during the fast stage of the interaction indicated that oxygen dissolved in the Ti lattice in a few seconds. The maximum increase of 1.1 eV in ϕ was reached at an equilibrium pressure p approximately 10^{-4} Torr. When p was raised above 10^{-4} Torr ϕ decreased by 0.4-0.8 eV which suggests that crystals of an oxide were being formed on the film. For $p > 1$ Torr and exposure $> 10^4$ Torr s there were further changes approximately 0.2 eV in ϕ which showed that the oxide was not stable. There was also a change approximately 0.1 eV due to a weakly bound adspecies which was desorbed when the gas was pumped off.