

# The interaction of titanium films with water vapour over a wide range of pressures and exposures

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## Abstract

The changes of work function  $\phi$  and resistance  $R$  were studied when titanium films were exposed to water vapour at pressures  $p$  from UHV to 1.5 Torr and exposures  $q$  from 0- $10^4$  Torr s. The work function was reduced by 0.8+or-0.2 eV at  $p$  approximately  $10^{-3}$  Torr and  $q$  approximately 1 Torr s, then at  $p$  approximately  $10^{-2}$  Torr and  $q$  approximately 10-100 Torr s it began to increase again. Finally when  $p$  was increased to 1.5 Torr and  $q$  to approximately  $10^4$  Torr s  $\phi$  was 0.1 eV less than the original value of  $\phi$  for the clean film. The resistance was increased monotonically by about 10%. Hydrogen was evolved as each dose of water vapour was added to the film, and some of it was re-absorbed by the film. Complementary studies were made of the effects of mixtures  $H_2$  and  $O_2$ , and of the successive sorptions  $H_2O/O_2/Ti$  and  $O_2/H_2O/Ti$ . The data implied that the decrease in  $\phi$  was mainly due to the effects of the adspecies OH and  $H_2O$  and the subsequent increase in  $\phi$  may have been due to a mixed layer of oxides and hydroxide forming on the metal surface.