

Content of hydrogen in boron-, carbon-, nitrogen-, oxygen-, fluorine-, and neon-implanted titanium

Soltani-Farshi M, Baumann H, Rück DM, Richter E, Kreissig U, Bethge K
SURFACE & COATINGS TECHNOLOGY 103-104 (1998) 299-303

Commercially available pure titanium contains a significant amount of hydrogen. Ion implantation into pure titanium samples distorts the lattice causing the hydrogen to diffuse into the implantation region and can thus affect the formation of phases (defects, vacancies). In this work, the effects of hydrogen content were examined for ion-implanted titanium samples. The implantation of boron, carbon, nitrogen, oxygen and neon influences the hydrogen content in the implanted region of the titanium, but we found no effect after fluorine implantation. These effects were investigated as a function of the ion fluence (1×10^{16} through 1×10^{18} ions cm^{-2}). The concentration of the implanted elements was analysed with the (p, γ) -nuclear reaction as well as with non-Rutherford backscattering. The accumulated hydrogen in the implanted layer was profiled using the ^{15}N -technique. If the concentration depth distribution of the implanted element exceeds a certain value, binary phases of these elements with titanium are detected by grazing incidence X-ray diffraction. In the region of the new phase, the previously accumulated hydrogen almost disappears. This effect gives additional information about phase formation.