

## **Thermal behaviour of implanted nitrogen and accumulated hydrogen in titanium**

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Titanium nitride is widely used as a coating material. To prepare TiN coatings by nitrogen implantation, it is important to know both the absolute N concentration and the accurate N depth profile, and its alteration by thermal treatment. Ti can absorb and store large amounts of hydrogen, but the solubility and mobility of H in the surface and near surface regions are affected by N implantation. The influence of nitrogen ion implantation on the hydrogen accumulation in titanium was investigated as function of sample temperature and ion fluence. 150 keV nitrogen ( $^{15}\text{N}$ ) ions were implanted at different sample temperatures up to 700°C with fluences ranging from  $1 \times 10^{17}$  to  $1 \times 10^{18}$  ions/cm<sup>2</sup>. The amount of accumulated hydrogen and its depth distribution was measured quantitatively with the  $^{15}\text{N}$  depth profiling method. The implanted  $^{15}\text{N}$  depth profiles were measured by the reverse reaction at 429 keV. The binary phases of the implanted nitrogen with titanium are detected by grazing incidence X-ray diffraction. The results are compared with those obtained for samples implanted at RT and subsequently thermally treated.