

# Effects of nickel ions implantation and subsequent thermal annealing on structural and magnetic properties of titanium dioxide

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## Abstract

© Published under licence by IOP Publishing Ltd. Wide bandgap semiconducting rutile (TiO<sub>2</sub>) doped with 3d-elements is a promising material for spintronic applications. In our work a composite material of TiO<sub>2</sub>:Ni has been formed by using implantation of Ni<sup>+</sup> ions into single-crystalline (100)- and (001)- plates of TiO<sub>2</sub>. Sub-micron magnetic layers of TiO<sub>2</sub> containing nickel dopant have been obtained at high implantation fluence of  $1 \times 10^{17}$  ion/cm<sup>2</sup>. A part of the implanted samples was then annealed in vacuum at different temperatures  $T_{ann}$  450-1200 K for 30 min. The influence of the implantation fluence, crystalline orientation, as well as subsequent annealing on the structural and magnetic properties of the nickel-implanted TiO<sub>2</sub> have been investigated by using X-ray photoelectron spectroscopy, scanning electron microscopy and coil magnetometry techniques.

<http://dx.doi.org/10.1088/1742-6596/572/1/012048>

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