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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 (TiO₂) doped with 3d-elements is a promising material for spintronic applications. In our work a composite material of TiO₂:Ni has been formed by using implantation of Ni⁺ ions into single-crystalline (100)- and (001)- plates of TiO₂. Sub-micron magnetic layers of TiO₂ containing nickel dopant have been obtained at high implantation fluence of 1×10^{17} ion/cm². 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 TiO₂ have been investigated by using X-ray photoelectron spectroscopy, scanning electron microscopy and coil magnetometry techniques.

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