

## Giant room temperature ferromagnetism in rutile TiO<sub>2</sub> implanted by Co

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### Abstract

Giant room temperature ferromagnetism has been observed, for the first time, in the Co ion-implanted rutile TiO<sub>2</sub>. The Co ions have been accelerated to 40 keV and implanted into TiO<sub>2</sub> (100) and TiO<sub>2</sub> (001) substrates. Both as prepared and temperature annealed samples were studied by magnetic resonance technique in the temperature range of 4-300 K. Strongly anisotropic ferromagnetic resonance (FMR) signals have been observed in the as prepared (100) and (001) TiO<sub>2</sub> samples. The theoretical analysis of FMR data has revealed rhombic magnetic anisotropy energy for Co-doped rutile TiO<sub>2</sub>. The temperature annealing drastically affects the magnetic properties of the samples resulting in disappearance of the ferromagnetism and formation of paramagnetic Co<sup>2+</sup> centers. © 2004 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

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