

## **Magnetic and Transport properties of $\text{Cr}_{1-x}\text{Ti}_x\text{N}_\delta$ solid solution nitrides**

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We have synthesized  $\text{Cr}_{1-x}\text{Ti}_x\text{N}_\delta$  ( $x = 0.1\sim 0.7$ ) solid solution nitrides by the standard arc melting technique. The crystal structure of  $\text{Cr}_{1-x}\text{Ti}_x\text{N}_\delta$  is face-centered cubic which is the same as CrN and TiN. The magnetic and transport properties were measured under wide temperature and magnetic field ranges. It changes from the ferromagnetic phase to the paramagnetic phase with increasing temperature. The Curie temperature is 131 K for  $x = 0.1$ . It reaches the maximum value of 135 K for  $x = 0.5$  and then decreases for higher Ti composition. Coercivity has the maximum value for  $x = 0.1$  specimen. Those samples display soft ferromagnetism. The coercivities are 15.5 Oe at 5 K and 4.5 Oe at 50 K for  $x = 0.5$  specimen. The magnetization is weaker when doping ratio  $x$  is decreasing. The resistivity of  $\text{Cr}_{1-x}\text{Ti}_x\text{N}_\delta$  was investigated by standard four-point technique. It displays a transition from nonmetallic phase to metallic phase as temperature decreases and the transition temperature is in agreement with the Curie temperature. The magnetoresistance was observed in the ferromagnetic regime for all samples. Electron Paramagnetic Resonance study of  $\text{Cr}_{1-x}\text{Ti}_x\text{N}$  ( $x=0.4 \sim 0.7$ ) nitrides above  $T_c=140$  K illustrates that the resonance absorption intensity decreases as the Ti composition increases.