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稀磁半导体Zn1−xNixO的室温铁磁性

彭 坤1，2，周灵平1，胡爱平1，唐元洪1

(1. 湖南大学 材料科学与工程学院，长沙 410082；
2. 中南大学 粉末冶金国家重点实验室，长沙 410083)

摘 要：利用溶胶-凝胶方法制备不同成分的$Zn_{1-x}Ni_xO$(x=0.05，0.10，0.15)稀磁半导体材料，产物由直径约70 nm的六边形颗粒组成。利用振动样品磁强计测量了样品的磁学性能，发现在室温条件下存在明显的铁磁性，且随着镍浓度的增加，样品的饱和磁化强度增加，但样品的单个镍原子的磁矩是逐渐下降的。X射线衍射分析结果表明，样品中不存在镍及镍的氧化物，且晶格常数随镍含量的增加而略有增大，并利用M—T曲线测量$Zn_{0.9}Ni_{0.1}O$居里温度为575 K左右，表明其磁性来源于稀磁半导体。

关键字：稀磁半导体；ZnO；铁磁性

Room temperature ferromagnetism in Zn1-xNixO diluted magnetic semiconductor

PENG Kun1, 2, ZHOU Ling-ping1, HU Ai-ping1, TANG Yuan-hong1

(1. College of Materials Science and Engineering, Hunan University,Changsha 410082, China;
2. State Key Laboratory of Powder Metallurgy, Central South University, Changsha 410083, China)

Abstract: A series of Zn1-xNixO(x=0.05, 0.10, 0.15) diluted magnetic semiconductors are fabricated by using sol-gel method, and the products consist of hexagonal nanoparticles with about 70 nm in diameter. The measurement of magnetism was carried out by a vibrating samples magnetometer (VSM), it was found that the samples show ferromagnetism under the room temperature, and with the increase of Ni-ion content, the saturated magnetization increase, but the averaged atomic magnetic moments decrease. The X-ray diffraction results show that there is not any pure nickel or nickel-oxide in the samples and the lattice increases with the content of Ni-ion. It was determined that the Curie temperature of Zn0.9Ni0.1O at about 575 K by M—T curves, which confirmed Zn1−xNixO is ferromagnetism under room-temperature.

Key words: diluted magnetic semiconductor; ZnO; ferromagnetism

地 址：湖南省长沙市岳麓山中南大学内　　邮编： 410083

电 话： 0731-8876765，8877197, 8830410　　传真： 0731-8877197

电子邮箱： f-ysxb@mail.csu.edu.cn