

Invited talks:

May 25, 2004, Peking University, Beijing, China

May 28, 2004, 3rd International Workshop Surface, Interface and Thin-Film Physics, Shanghai, China

Ferromagnetism and Polaron Percolation in $\text{Mn}_x\text{Ge}_{1-x}$

Dilute Magnetic Semiconductor*

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We present a comprehensive study of ferromagnetism and transport in Mn-doped Ge, grown with molecular beam epitaxy. By carefully controlling the growth parameters, it is shown that ferromagnetism in $\text{Mn}_x\text{Ge}_{1-x}$ ($0 < x < 0.09$) is most adequately described within an impurity band model where the ratio J/t of the Mn-hole exchange J and hole hopping t is large, making $\text{Mn}_x\text{Ge}_{1-x}$ the first known dilute magnetic semiconductor (DMS) in this regime. Evidence of a ferromagnetic percolation transition at temperature T_C and presence of spin clusters between T_C and T_C^* with $T_C^* \gg T_C$ signals intriguing similarities between the physics of $\text{Mn}_x\text{Ge}_{1-x}$ DMS and colossal magneto-resistance (CMR) manganites.

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