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ZnO基稀磁半导体材料研究进展

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摘要 随着铁磁性半导体(如 Mn 掺杂 InAs 和 GaAs)的发现,稀磁半导体(DMS)近来吸引了众多研究者的目光。传统半导体不具有磁性,而稀磁半导体可以在不改变传统半导体其它性质的情况下引入磁性,具有良好的物理化学性能。从实验和理论计算两个方面总结了 ZnO 基 DMS 的国内外研究现状,讨论了各种生长方法、基底选择、生长温度对材料磁性的影响,总结了如何通过改变实验条件来增大饱和磁化强度及提高 Curie 温度。

关键词 ZnO 稀磁半导体 铁磁序 反铁磁序 电子结构

Research Development of ZnO-based Diluted Magnetic Semiconductor Materials

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Abstract Since the discovery of the semiconductors with ferromagnetism such as in (In, Mn)As and (Ga, Mn)As, the diluted magnetic semiconductors (DMSs), which opened a way to introduce the freedom of spin into semiconductors device, have attracted much interest because of their potentiality as new functional materials. In this paper, the current development of ZnO-based diluted magnetic semiconductors is summarized, and the influence of growth method, substrate, and temperature on their microstructure and magnetic properties is reviewed. Furthermore, the methods to achieve large magnetization and high Curie temperature by controlling the experimental conditions are discussed.

Key words ZnO, diluted magnetic semiconductors (DMSs), ferromagnetic order, antiferromagnetic order, electronic structure

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