

研究论文

强磁场作用对聚苯胺颗粒形貌及电性能的影响

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摘要 聚苯胺的聚合掺杂条件对其颗粒结构及其导电性能有着很大的影响. 本文在10 T强磁场的作用下用化学氧化溶液原位聚合法得到聚苯胺并观察充分聚合后聚苯胺的颗粒结构、形貌特征及与其形成复合材料的电性能. 实验表明, 在没有强磁场作用下掺杂聚苯胺颗粒呈现礁石状, 而强磁场作用下的原位聚合聚苯胺颗粒呈现直径大约50 nm的棒状, 但其复合材料的电阻率与没有强磁场相比高出3个数量级; 本征态聚苯胺在强磁场下再掺杂得到20~30 nm的球状颗粒, 其复合材料电阻率却降低1个数量级.

分析认为这主要由于强磁场对聚苯胺晶粒的取向作用以及强磁场对聚合掺杂过程的影响所致.

关键词 [聚苯胺](#) [强磁场](#) [颗粒形貌](#) [取向](#) [体电阻率](#)

分类号

Effects of High Magnetic Field on Grain Shape and Electrical Conductivity of Doped Polyaniline

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Abstract Conditions of polymerization and doping have great influence upon the grain shape and electrical performance of doped polyaniline (PA). In this paper, doped PA was obtained by chemical oxidation *in-situ* polymerization process in high magnetic field (HMF) and the grain structure and shape were studied by TEM and electrical performance of doped polyaniline composite. The results indicated that the grain shape of *in-situ* polymerized PA in HMF of 0 T was irregular reef-like, and that in HMF of 10 T was open-ramified rod-like with diameter of 50 nm, but the volume resistivity of the composite was about 3 order greater than that of the doped PA composite at 0 T. The grain shape of secondary doped PA at 10 T was changed to spherical structure about 20~30 nm in diameter, and the volume resistivity of its composite was about 1 order less than that of the doped PA composite at 0 T. It was thought that the reason for different grain shape and the electrical conductivity was anisotropic diamagnetic susceptibility of doped PA and orientations and the influence of the HMF on the polymerization and doping.

Key words [polyaniline](#) [high magnetic field](#) [grain shape](#) [orientation](#) [volume resistivity](#)

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