

高电压技术

纳米ZnO/低密度聚乙烯复合材料的介电特性

王霞 成霞 陈少卿 郑晓泉 屠德民

电力设备电气绝缘国家重点实验室(西安交通大学) 电力设备电气绝缘国家重点实验室(西安交通大学) 电力设备电气绝缘国家重点实验室(西安交通大学) 电力设备电气绝缘国家重点实验室(西安交通大学) 电力设备电气绝缘国家重点实验室(西安交通大学)

摘要: 聚合物纳米复合材料因其优良的介电、机械等性能在电介质领域得到广泛的应用。纳米粒子改性聚乙烯基绝缘材料具有很好的研究价值及工程意义。该文主要研究了表面经分散剂处理的纳米ZnO粒子添加剂与低密度聚乙烯(LDPE)共混物的介电特性。结果表明5%含量的纳米ZnO添加剂能有效提高聚乙烯基复合材料的体积电阻率和交流击穿强度。同时纳米添加剂虽增加了体内的残余电荷,但能有效抑制电极同极性电荷的注入。另外由于聚合物纳米复合材料的界面特异性,使得介电常数随着纳米ZnO含量的增加呈先减小后增大趋势,而损耗值却线性增加。纳米ZnO/聚乙烯复合材料介电性能提高归因于纳米粒子与聚乙烯分子间类似于深陷阱的界面效应。

关键词: 聚乙烯 纳米ZnO 空间电荷 介电特性

Dielectric Properties of the Composites of Nano-ZnO/Low-density Polyethylene

WANG Xia CHENG Xia CHEN Shao-qing ZHENG Xiao-quan TU De-min

State Key Laboratory of Electrical Insulation and Power Equipment (Xi'an Jiaotong University) State Key Laboratory of Electrical Insulation and Power Equipment (Xi'an Jiaotong University) State Key Laboratory of Electrical Insulation and Power Equipment (Xi'an Jiaotong University) State Key Laboratory of Electrical Insulation and Power Equipment (Xi'an Jiaotong University) State Key Laboratory of Electrical Insulation and Power Equipment (Xi'an Jiaotong University)

Abstract: Nanocomposite has been applied widely in dielectrics and electrical insulation due to its extraordinary properties in mechanics, dielectric properties, and so on. Polyethylene is widely used as an insulation material, the modification of polyethylene by nano-filler will has great researching value and engineering significance. Dielectric properties were studied in samples of low density polyethylene (LDPE) to which nano-sized ZnO particles and a dispersant had been added. It is found that nano-filler can effectively improve the volume resistivity and AC breakdown strength, especially in the 5% ZnO composite. At the same time, the nano-filler increased the remaining charges but effectively restricted the homocharge injection from electrode. Due to the interfacial specificity, the permittivity decreased firstly and then increased with the increase of ZnO content; whereas the loss tangent increased linearly. The improvement in dielectric properties is attributed to the interface or interaction zone between ZnO nanoparticle and LDPE molecule, which acts as deep traps in bulk.

Keywords: polyethylene nano-ZnO space charge dielectric properties

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通讯作者: 王霞

作者简介:

作者Email: wxflying@mail.xjtu.edu.cn

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1. 董长青 杨勇平 倪景峰 金保升.木屑和聚乙烯流化床共气化实验研究[J]. 中国电机工程学报, 2007,27(5): 55-60
2. 郑晓泉 G Chen A E Davies.交联聚乙烯电缆绝缘中的双结构电树枝特性及其形态发展规律[J]. 中国电机工程学报, 2006,26(3): 79-85
3. 王霞 陈少卿 成霞 屠德民.电声脉冲法测量聚合物绝缘表面陷阱能级分布[J]. 中国电机工程学报, 2009,29(1): 127-132

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