铁掺杂0.2PZN-0.8PZT铁电陶瓷Raman散射研究

路朋献[1,2], 朱满康[1], 侯育冬[1], 宋雪梅[1], 汪浩[1], 严辉[1]

1. 北京工业大学材料学院, 北京 100022;
2. 河南工业大学材料学院, 郑州 450052

摘要　采用Raman散射方法研究了铁掺杂$Pb(Zn_{1/3}Nb_{2/3})_{0.2}(Zr_{0.5}Ti_{0.5})_{0.8}O_3$(0.2PZN-0.8PZT) 铁电陶瓷中三方-四方共存现象. 通过分析四方相$E(3TO)$和$A_1(3TO)$模式与三方相R I模式之间的相对强度, 以及四方相$E(3LO)$和$A_1(3LO)$模式与三方相R h模式之间的相对强度, 确定了铁掺杂对0.2PZN-0.8PZT陶瓷中三方-四方共存结构的影响, 并得到了XRD相分析的验证. 因此, 通过分解Raman散射中三方-四方振动模式, 可以表征掺杂对PZT基陶瓷中三方-四方共存现象的变化趋势.

关键词　Raman分析　PZT相变　铁掺杂　XRD分析

分类号　0437

Raman Scattering Studies on Fe_2O_3-modified 0.2PZN-0.8PZT Piezoceramics

LU Peng-Xian[1,2], ZHU Man-Kang[1], HOU Yu-Dong[1], SONG Xue-Mei[1], WANG Hao[1], YAN Hui[1]

1. College of Materials Science and Engineering, Beijing University of Technology, Beijing 100022, China;
2. School of Materials, Henan University of Technology, Zhengzhou 450052, China

Abstract Raman scattering spectroscopy is widely used to investigate the phase transition of ferroelectrics, including the ferroelectric-paraelectric transition. In the present paper, the phase coexistence of rhombohedral and tetragonal phases caused by Fe2O3 doping in $Pb(Zn_{1/3}Nb_{2/3})_{0.2}(Zr_{0.5}Ti_{0.5})_{0.8}O_3$(0.2PZN-0.8PZT) ceramics was investigated by Raman scattering spectroscopy in detail. On the basis of the Raman scattering analysis on the tetragonal $E(3TO)$ and $A_1(3TO)$ modes and the rhombohedral R I mode, or on the tetragonal $E(3LO)$ and $A_1(3LO)$ modes and the rhombohedral R h mode, the tendency of phase transition induced by Fe_2O_3 doping was evaluated, which has been affirmed by XRD results. This indicates that Raman scattering analysis is an effective way to investigate the doping effect on the phase coexistence in PZT based ceramics.

Key words Raman analysis　PZT phase transition　Fe2O3 doping　XRD analysis

DOI:

通讯作者 朱满康 zhumk@bjut.edu.cn