

研究论文

La₂O₃掺杂BST/Mg₂TiO₄微波复合陶瓷的制备和性能

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摘要: 用固相烧结法制备掺杂La₂O₃的Ba_{0.55}Sr_{0.45}TiO₃/Mg₂TiO₄微波复合陶瓷, 研究了掺杂对其微观结构、微波($f=10$ GHz)介电性能和调谐率的影响。结果表明: 当掺杂La₂O₃量(质量分数)为1.2%时, La³⁺进入BST晶格, 且抑制了BST/Mg₂TiO₄中Ti从+4向+3价转化; La₂O₃的掺入比较明显地降低了介电常数和微波损耗, 当掺杂La₂O₃量为1.2%时介电常数为52, 损耗角为0.0011($f=10$ GHz), 调谐率13.6%(3 kV/mm)。

关键词: 无机非金属材料 La₂O₃掺杂 固相烧结法 BST复合陶瓷 微波损耗 调谐率

Preparation and Properties of La₂O₃ Doped BST/Mg₂TiO₄ Microwave Composite Ceramics

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Abstract: La₂O₃ doped Ba_{0.55}Sr_{0.45}TiO₃/Mg₂TiO₄ microwave composite ceramics were prepared by traditional solid-state reaction, and the influence of La₂O₃ doping on microstructure, dielectric properties and tuning was investigated. The results show that La³⁺ enters BST lattices when the mass fraction of La₂O₃ reach 1.2%, and La³⁺ doped sample can prevent the change of the chemical valence of Ti in BST/Mg₂TiO₄ composite system from +4 to +3. Mg₂TiO₄ and La₂O₃ doping can reduce the dielectric constant and microwave loss separately. The 1.2% La₂O₃ doped sample has the best properties: dielectric constant 52; $\tan\delta$ 0.0011 (10 GHz), and the tunability 13.4% (3 kV/mm).

Keywords: inorganic non-metallic materials, La₂O₃ doped, solid-state reaction, BST composite inorganic non-metallic materials La₂O₃ doped solid-state reaction BST composite ceramics microwave loss tunability ceramics microwave loss tunability

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