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High dielectric and microwave absorption properties of ultra-thin $1-x\text{SrTiO}_{3.8}-x\text{SrAl}_{12}\text{O}_{19}$ films

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Abstract

To reduce the thickness of the microwave absorbing materials, we have prepared $1-x\text{SrTiO}_{3.8}-x\text{SrAl}_{12}\text{O}_{19}$ ceramics by hot-pressing sintering in the vacuum. The microstructure, dielectric, thermogravimetric analysis and microwave absorbing properties of $1-x\text{SrTiO}_{3.8}-x\text{SrAl}_{12}\text{O}_{19}$ were systematically investigated and discussed. The $0.95\text{SrTiO}_{3.8}-0.05\text{SrAl}_{12}\text{O}_{19}$ has high permittivity, the real part is from 1662.2 to 704.9 and the imaginary part is from 208.6 to 12. The absorption bandwidth (reflection loss ≤ -5 dB) of $0.95\text{SrTiO}_{3.8}-0.05\text{SrAl}_{12}\text{O}_{19}$ can cover 8.6–12.4 GHz and its thickness is only 0.232 mm which is much thinner than these recently reported by other researchers. For $0.942\text{SrTiO}_{3.8}-0.058\text{SrAl}_{12}\text{O}_{19}$, the peak value of reflection loss is up to -58.5 dB with a thickness of 0.75 mm. The $1-x\text{SrTiO}_{3.8}-x\text{SrAl}_{12}\text{O}_{19}$ films could be excellent candidates for highly efficient and ultra-thin microwave absorbing materials.

Keywords: $1-x\text{SrTiO}_{3.8}-x\text{SrAl}_{12}\text{O}_{19}$; Ultra-thin; Permittivity; Microwave absorption

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