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Microwave Dielectric Properties of Low-Temperature Sinterable α-MoO_3

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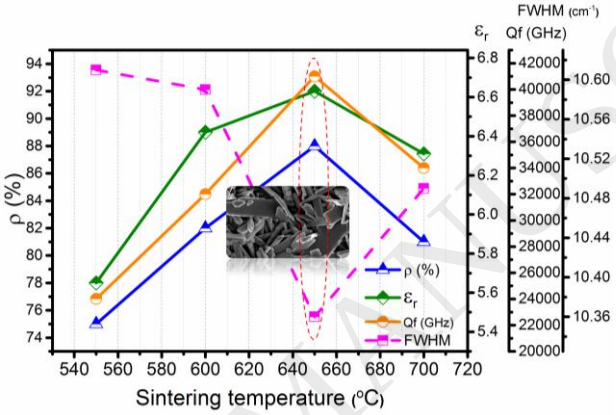
TOC Graph

TOC Synopsis: Raman spectrum, low temperature sintering and high quality factor α-MoO_3 binary ceramics



Abstract

The α-MoO_3 ceramics were prepared by uniaxial pressing and sintering of MoO_3 powder at 650 °C and their structure, microstructure, densification and sintering and microwave dielectric properties were investigated. The sintering temperature of α-MoO_3 was optimized based on the best densification and microwave dielectric properties. After sintering at 650 °C the relative permittivity was found to be 6.6 and the quality factor was 41,000 GHz at 11.3 GHz. The full-width half-maximum of the A_{1g} Raman mode of bulk α-MoO_3 at different sintering temperatures correlated well with the Qf values. Moreover, the sintered samples showed a temperature coefficient of the resonant frequency of -25 ppm/°C in the temperature range from -40 to 85 °C and they exhibited a very low coefficient of thermal expansion of ±4 ppm/°C. These microwave dielectric properties of α-MoO_3 will be of great benefit in future MoO_3 based materials and their applications.