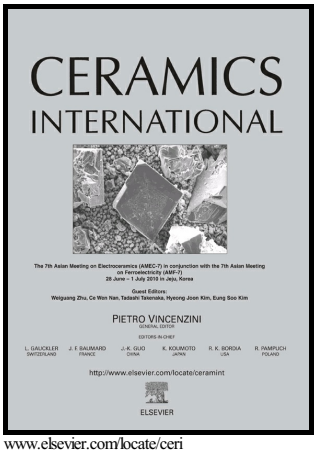

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The Dielectric Constant and Quality Factor Calculation of the Microwave Dielectric Ceramic Solid Solutions

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Abstract

The dielectric constant of the microwave dielectric ceramic solid solution is usually predicted by the Clausius-Mosotti equation but the quality factor (Q) cannot be precisely calculated. In this paper, it finds that the dielectric constant of the solid solutions also could be well calculated by the Maxwell-Wagner formula, and that the Q of solid solutions can be precisely calculated, by assuming a solid solution as a two or more materials' mixture.

Keywords: Classical Dispersion Theory; Solid Solutions; Quality Factor.

I. Introduction

Due to the high dielectric constant (ε_r) and high quality factor (Q), microwave dielectric ceramics are nowadays widely applied in microwave applications, for example, resonators.[1-4] The high dielectric constant ε_r can let the size of components be small and the high quality factor (Q) represents low energy loss.[1-4]