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New Frontiers in Multifunctional Material Science and Processing

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Influence of Mechanical Activation on the Constituents of the MgO-Al₂O₃-SiO₂-MoO₃ System

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Cordierite, 2MgO·2Al₂O₃·5SiO₂ (MAS), is high-temperature ceramic material. Cordierite is commonly used material because of outstanding electrical properties, low temperature expansion coefficient and low dielectric constant. In order to accelerate the process of sintering, 5.00 mass% MoO₃ has been added to the starting mixtures. The mechanical activation of the starting mixtures was performed in a high energy ball mill during 0-160 minutes. All starting mixtures were sintered at 1100°C, 1200°C and 1300°C for 2h. The particle size analysis (PSA) was employed in order to determine the changes in the particle size of the mechanically treated powders. The phase composition of the starting powders was analyzed by the X-ray diffraction method. Differential thermal (DTA) and thermogravimetric (TG) analysis were used in order to determine characteristic temperatures within the system during heating. Based on the obtained DTA results, it was established that mechanical activation with additive MoO₃, has influence on decreasing sintering temperatures for about 150°C.

Keywords: Mechanical activation, XRD, DTA/TG, Cordierite.