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# BOOK OF ABSTRACTS

**Editors:**
**Andrei Rotaru**
**Stefano Vecchio Ciprioti**


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# Influence of mechanical activation on kinetics and formation of spinel monitored by DTA

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Magnesium aluminate and other alumina-based spinels are refractory ceramics with excellent properties, such as high hardness, high mechanical strength, and low dielectric constant, applicable in many modern industries. $MgAl_2O_4$ was produced by solid state reaction between MgO and $\alpha$-$Al_2O_3$ powders. Mechanical activation represents a very efficient method for increasing the reactivity of powders, accelerating chemical reactions and decreasing the sintering temperatures. Mechanical activation of mixed powders was performed in a high-energy planetary ball mill in air for 60 minutes. Sintering was performed in air at temperatures ranging from 1200°C to 1600 °C with a 2 h dwell time. Initial powders and sintered samples were characterized using X-ray diffraction and scanning electron microscopy.

Differential thermal analysis (DTA) and thermal gravimetry (TG) were used to determine the temperatures for synthesis reactions and phase transformations. Based on the DTA results, several different processes occured during heating, including evaporation of physisorbed water, decomposition of $Mg(OH)_2$, and spinel formation. With mechanical activation, all characteristic temperatures shifted to lower values, and peaks were more pronounced. Raman spectra were used to characterize the degree of inversion as a function of sintering temperature for all of the sintered specimens.

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