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Role of the Additive Components in Self-Propagating High-Temperature Synthesis of Silicon Nitride

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ABSTRACT

Silicon nitride (Si_3N_4), was prepared by SHS under high nitrogen gas with different additives. The aim of this work was to understand the role of the additives components on the SHS reaction.

The influence of two experimental parameters (composition of the reactant mixture and nitrogen pressure) was studied. The SHS sample were characterized by using X-ray diffraction and SEM analysis. Rietveld refinement was performed on recorded diffractograms in order to determine the composition of the SHS products. From our results, a mechanism of formation for Si_3N_4 was suggested and the role of additives was shown. This study also allows us to explain ambiguous results previously reported in the literature.

Keywords: Si_3N_4; Self-propagating High-temperature Synthesis (SHS); Mechanism of formation; High pressure; Ceramic nitrides.