

**Gas-pressure Sintering of Silicon Nitride with
Various Rare-earth Sintering Additives**

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Densification behavior, phase and structure formation in silicon nitride based materials with mixed $Y_2O_3+RE_2O_3$ ($RE = La, Nd, Yb$) and Al_2O_3 sintering additives under conditions of gas-pressure (up to 1,5 MPa of N_2) sintering were investigated. Constant molar fraction of the total amounts of oxides (7 mol%) was used. The $(Y_2O_3+RE_2O_3)$ to Al_2O_3 molar ratio corresponding to garnet phase composition, $3(RE_2O_3+Y_2O_3)5Al_2O_3$, was kept constant for all mixtures. The RE_2O_3/Y_2O_3 ratio was a variable composition parameter. The influence of different RE-oxides, known to produce in the course of sintering liquid phase with different intrinsic properties, on the microstructure development and resulting grain morphology is elucidated. Possibilities of premeditated modification of structure-sensitive properties of sintered silicon nitride based ceramic materials by means of RE-oxide sintering additives combination are considered.