

## Use of Additives to Improve Microstructure and Fracture Resistance of Silicon Nitride Ceramics

### **Disclosure Number**

200601761

### **Technology Summary**

Addednum: In the original description, additives to silicon nitride powders were used to control microstructure and hence properties of the silicon nitride ceramics. The key words are silicon nitride powders (commercially available powders are >90% alpha Si<sub>3</sub>N<sub>4</sub>) . Basically, we use the additives to control the alpha to beta phase transformation and subsequent growth of beta Si<sub>3</sub>N<sub>4</sub> grains. However, silicon nitride ceramics can also be produced by nitriding silicon powders followed by densify at elevated temperatures (known variously as RBSN-reaction bonded Si<sub>3</sub>N<sub>4</sub> or RSSN-reaction sintered Si<sub>3</sub>N<sub>4</sub>). During the nitriding step alpha phase is also formed and begins to partially transform to beta phase. So one could use our approach of using the rare earth additives to manipulate the microstructure. These latter processing approaches can be a more economical approach to producing silicon nitride ceramics.

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