

## Development of SiAlON ceramics for tribological applications

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The aim of the study was to develop cost effective SiAlON ceramics' production technologies to use these materials for tribological applications. Two different varieties of  $\text{Si}_3\text{N}_4$  powders were used to prepare SiAlON ceramics. 100%  $\beta\text{-Si}_3\text{N}_4$  was used from Chinese refractory powders and one proprietary SiAlON composition of MDA ceramics was used to prepare the samples. Since SiC + SiAlON composites reportedly perform better<sup>1</sup>, batches were prepared with 15% SiC addition to Chinese refractory powders and 17.5% SiC was added to MDA SiAlON composition. The samples were gas pressure sintered at 1840°C and at 22 bar with one hour dwelling time. Thereby, we could achieve 97-98% theoretical density. The elastic modulus was recorded 14-17 GPa while fracture toughness varied from 4.3 - 5 MPam<sup>1/2</sup>. Fretting experiments showed initial running-in period of 300 cycles for all the tribo-couples. After which, the steady state coefficient of frictions (COF) were achieved. For steel ball of 10 mm diameter, fretting against MDA composition showed 0.6 average steady state COF while the same composition while fretting against alumina ball of same diameter showed 0.57 average steady state COF. These values are in agreement with the literature.<sup>2-4</sup> Results have been compared with SiAlON composition derived from Chinese refractory powder and found that the MDA composition perform better under identical test conditions. Cytocompatibility study also confirms that the investigated SiAlON and SiAlON-SiC composite can be used as substrate to support cell adhesion and proliferation of L929 mouse fibroblast and SaOS-2 osteoblast.

### References:

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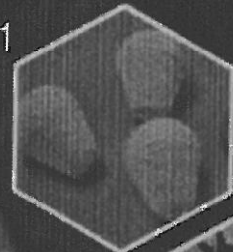
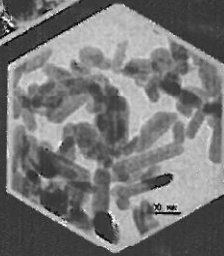
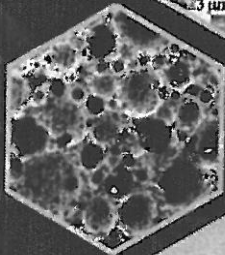
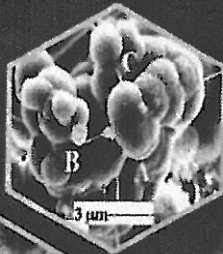


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