Steam Oxidation Resistant Ceramics for SiC Protection
Northboro R&D Center, Saint-Gobain Innovative Materials, Northboro, MA

Working together to solve your most difficult challenges by engineering high-performance ceramics and refractories.

**GOAL**
- Enable solar fuel reactors in 1500°C steam
- Need high temp. components such as SiC

**Ta₂O₅ stabilizing**
- Ta₂O₅ exhibits volumetric phase change at 1400°C but can be avoided with 4% Al₂O₃ addition
- Thermal expansion behavior of stabilized Ta₂O₅ matches SiC well
- Recession performance inferior to SiC at atmospheric pressure, but superior to SiC at 5 atm
- Development of Ta₂O₅ and other environmental barrier coatings (EBC) for SiC is in progress

**Proposal: Ta₂O₅ Coating on SiC**

**Conclusions:**
- 4% Al₂O₃ can stabilize Ta₂O₅
- Thermal expansion matches SiC well
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**Summary**

**Engineered Ceramics** partners with you to engineer sustainable solutions for your most difficult problems

- Hexoloy® the ultimate solution in the harshest environments
  - High corrosion and wear resistance
  - High erosion resistance
  - High temperature capabilities
  - Low electrical conductivity

**SiRIS/SiSiC radiant tubes**
The enhanced solution for high temperature industrial furnaces
- Maximize energy efficiency, reduce power consumption
- Extend service life-time
- Limit maintenance service