

**THE EFFECT OF ADDITION OF ZRO<sub>2</sub> AS SECONDARY PARTICULATES IN MICROWAVE SINTERING OF SILICON NITRIDE AT 2.45 GHZ.**

\*Sreekumar Chockalingam      David A. Earl  
Alfred University              Alfred University  
2 Pine Street                    2 Pine Street  
Alfred, NY 14802                Alfred, NY 14802  
[sc4@alfred.edu](mailto:sc4@alfred.edu)                    [earlda@alfred.edu](mailto:earlda@alfred.edu)

Dr. Holly S. Shulman  
Ceralink Inc.  
200 North Main St.  
Alfred, NY 14802  
[holly@ceralink.com](mailto:holly@ceralink.com)

Zirconia particulates (0-12 wt%) were added to a silicon nitride composition to determine the effects on the mechanical properties when heated in a microwave field. The original concept was that fast heating may prevent over stabilization and add to the toughness through transformation toughening of zirconia (partially stabilized). In addition zirconia couples better than silicon nitride and would aid in the microwave heating process. It was found that small additions of zirconia, as low as 2 wt%, drastically improved the microwave heating and densification. Zirconia also improved the alpha to beta conversion of silicon nitride and resulted in higher aspect ratio grains. This effect was not observed in conventionally sintered silicon nitride. Results from x-ray diffraction, hardness and toughness measurements, and microstructural evaluation will be presented. Work is ongoing to determine if increased toughness is due to transformation toughening or microstructural modifications from the zirconia addition.