



**PRESS RELEASE**  
**For Immediate Release**  
**December 23, 2010**



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### **Ceralink Presenting 4 Talks at Daytona 2011**

35rd International Conference & Exposition on Advanced Ceramics and Composites  
Daytona Beach, FL - January 23-28, 2011

#### **Tuesday, January 25, 2011**

<b>Time</b>	<b>Session Info / Title</b>
1:40 PM - 5:20 PM, Coquina Salon B, <b>Novel Forming and Sintering II</b>	
1:40 - 2:00 PM	ICACC-S8-023-2011. Rapid limestone calcination using Microwave Assist Technology <u>M. Fall</u> ; S.M. Allan; H.S. Shulman
2:00 - 2:20 PM	ICACC-S8-024-2011. Pressureless microwave sintering of aluminum nitride <u>H.S. Shulman</u> ; S. Allan; N. Vandervoort; M.L. Fall; M. Elmer

#### **Wednesday, January 26, 2011**

<b>Time</b>	<b>Session Info / Title</b>
2:30 PM - 5:10 PM, Coquina Salon D, <b>Manufacturing</b>	
2:30 - 2:50 PM	ICACC-S4-044-2011. Improving Radio Frequency Lamination Method for Armor Panels <u>S.M. Allan</u> ; M. Fall; H. Shulman

#### **Thursday, January 27, 2011**

<b>Time</b>	<b>Session Info / Title</b>
1:30 PM - 4:00 PM, Coquina Salon F, <b>Synthesis and Processing</b>	
3:20 - 3:40 PM	ICACC-FS1-004-2011. Microwave Processing of Geopolymers and Evolved Glass-Ceramic Composites <u>T.A. Gubb</u> ; H.S. Shulman; M.L. Fall; W.M. Kriven

## **Presentation Abstracts**

### **Rapid Limestone Calcination using Microwave Assist Technology**

**ABSTRACT BODY:** Microwave Assist Technology (MAT) is being applied to the calcination of limestone for use in the cement, steel and glass industries. This presentation will include studies of microwave materials interactions through dielectric property measurements, process modeling, and lab scale microwave hybrid calcination tests. Microwave Assist Technology is a method to simultaneously apply traditional radiant heat and microwave energy in the same kiln, leading to fast volumetric product heating. Microwave thermal activation targets and directly heats limestone, eliminating the reliance on thermal conduction as a means of energy transfer. In addition less energy is wasted in heating non-product, such as the atmosphere and kiln lining. This technology has the potential to increase the speed of lime production by decreasing both the reaction time and temperature, further reducing energy consumption. Full scale implementation of microwave hybrid calcining of limestone is expected to save 46 trillion BTU/yr in the lime industry and 200 trillion BTU/yr in the cement industry.

### **Pressureless Microwave Sintering of Aluminum Nitride**

**ABSTRACT BODY:** Microwave sintering is being explored as a low cost, alternative to hot isostatic pressing for thermal management materials. Pressureless microwave heating was used to sinter yttria-doped aluminum nitride (AlN) to full density in a fast process. Aluminum nitride doped with in-situ carbon nanotubes was also sintered. An ultrahigh temperature, microwave transparent thermal package was developed to reach temperatures above 1800 °C, needed to sinter AlN and other ultrahigh temperature ceramics. In addition, a novel ultrahigh temperature microwave susceptor composition was used. Dielectric properties as a function of temperature were measured for AlN. The results and analysis of microwave sintered AlN compacts will be presented, including density, hardness, microstructure, dielectric properties, and thermal conductivity.

### **Improving Radio Frequency Lamination Method for Armor Panels**

**ABSTRACT BODY:** Radio Frequency (RF) Lamination is a new technology that shows promise for eliminating the need for autoclaving for transparent armor. The technology has been used to laminate single-pane glass laminates in less than 1 minute, and multilayer transparent armor panels (3.8 cm thick) in just five minutes. Optical and V-50 ballistic testing of RF laminated ballistic windows confirm that properties and performance meet the specification criteria required for armor windows. Demonstrations to date have shown equivalent performance for thermoplastic polyurethane (TPU) laminated windows. Recently, lamination of polyvinyl butyrate (PVB)-bonded windows has been studied with a focus on producing environmentally stable laminates. Laminates were studied using accelerated aging tests, mechanical performance testing, and non-destructive evaluations of adhesion bonding strength. Results of PVB-laminate progress and performance will be presented.

## **Microwave Processing of Geopolymers and Evolved Glass-Ceramic Composites**

**ABSTRACT BODY:** An investigation into the effects of thermal treatments of geopolymers using microwave and Microwave Assist Technology™ was conducted. Historically, geopolymers have undergone conventional heat treatment to produce the glass-ceramic phase transitions. However, due to the well known benefits of microwave heating and sintering, this method is being explored as a high-efficiency alternative.

Multiple geopolymer compositions (alumina-silicate, Na/K charge balanced, reinforced and unreinforced) were microwave heated to 500C and 1400C for dehydration and glass-ceramic formation respectively. Varying fiber reinforcement materials were substituted to determine an appropriate composite for direct microwave heating. Analysis and results include cost (efficiency), microstructural characterization, thermal, chemical, and mechanical properties will be presented.

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