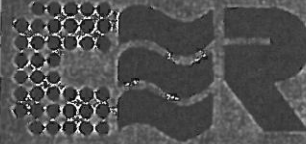


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EIGHTH



# CONFERENCE & EXHIBITION OF THE EUROPEAN CERAMIC SOCIETY

## PROGRAMME & ABSTRACT BOOK

29 JUNE - 3 JULY 2003

ISTANBUL CONVENTION & EXHIBITION CENTRE  
TURKEY



Turkish Ceramic Society

Organized on behalf of the European Ceramic Society

applications such as phase shifters in phased array antennas. In this review article, the underlying properties of heteroepitaxial ferroelectric/paraelectric thin films used in such applications are briefly reviewed, which is then followed by a condensed overview of the state of the art. Special emphasis will be given to the effect of biaxial state of stress (compressive and tensile), the nonlinear dielectric properties of BST thin films of 30-1100 nm thicknesses and in the range 1-20 GHz; and the pertinent stress/thickness dependent properties would be discussed. The effect of defects on especially the rf/microwave dielectric loss will be touched upon as well.

**953 (A1) The ceramic raw materials in Indonesia**

A. SUBARI

**954 (A1) Influence of non-ionic and cationic polymer on the rheological and colloidal properties of bentonite dispersions**

A. ALEMDAR<sup>1</sup>, V. BÜTÜN<sup>2</sup>, N. GÜNGÖR<sup>1</sup>,  
<sup>1</sup>Istanbul Technical University, Istanbul, Turkey,  
<sup>2</sup>Osmangazi University, Eskişehir, Turkey

The influence of the non-ionic (PEG) and cationic (modified polyethylene glycol, OEG-QDMA) polymers on the rheological and colloidal properties of Na-montmorillonite dispersions was investigated. The zeta potential and viscosity measurements were carried out as a function of polymer type (non-ionic and cationic) and their concentrations (0,01-100 g/L). The experimental data were interpreted taking into account these two parameters. 2-(dimethylamino)ethyl methacrylate (DMA) was polymerized with monomethoxy-capped oligo(ethylene glycol), OEG, by using aqueous atom transfer radical polymerization (ATRP) chemistry. The tertiary amine residues of the resulting polymer were then quaternized with methyl iodide in order to obtain cationic polyelectrolyte. The rheological parameters (the plastic viscosity and the yield value) were obtained by shear stress-shear rate measurements in a rotational low-shear rheometer. The zeta potential of the Na-montmorillonite particles was measured as a function of polymer concentration. The results indicated that non-ionic PEG adsorbed on the clay surface through hydrogen bonding. The plastic viscosity increased with an increase in the molecular weight of PEG. We observed a gradual increase in gelation by the addition of the cationic polymer which reached a maximum at the cationic polymer concentration between 0.4-0.8 g/L. Further increase in the cationic polymer concentration results with a reduction in this gelation.

**956 (C1) Near-infrared pulsed laser cleaning of marble: role of marble microstructure on induced damage**

C. RODRIGUEZ-NAVARRO, K. ELERT, E. SEBASTIAN, A. RODRIGUEZ-NAVARRO, Spain

**957 (A4) Preparation of ZrW<sub>2</sub>O<sub>8</sub> xerogel and aerogels by sol-gel chemistry**

L. NOAILLES<sup>1</sup>, B. DUNN<sup>1</sup>, D. LARSON<sup>1</sup>, J. STARKOVICH<sup>2</sup>, H.-H. PENG<sup>2</sup>, <sup>1</sup>University of California, Los Angeles, USA, <sup>2</sup>Northrop Grumman Space Technology, Redondo Beach, USA

Xerogels and aerogels with the composition ZrW<sub>2</sub>O<sub>8</sub> have been synthesized using sol-gel chemistry. For the xerogel, trigonal phase is formed at 650 °C and the cubic phase forms above 1100 °C in less than 30 seconds. Aerogels have been prepared with an average pore diameter of 110 Å and a surface area of 510 m<sup>2</sup>g<sup>-1</sup>.

**958 (B1) Development of laminar type of functionally graded SiAlON ceramics**

N. ÇALIŞ, Ş.R. KUŞHAN, F. KARA, H. MANDAL, Anadolu University, Eskişehir, Turkey

To improve the mechanical properties of SiAlON ceramics, laminar type of (with two layers) functionally graded SiAlON ceramics were developed. Our previous study showed a sharp transitional zone between the two layers in SEM analysis. The aim of this study is elimination of this sharp zone. For this purpose same metal oxides were doped to both layers which have different compositions. Phase characterisation, microstructural investigations and hardness measurements showed a gradual change in composition, microstructure and in hardness through the thickness of the sample without a sharp transitional zone.

**959 (B1) Production of functionally graded SiAlON ceramics by controlling the sintering conditions**

N. ÇALIŞ, Ş.R. KUŞHAN, H. MANDAL, Anadolu University, Eskişehir, Turkey

In this study, functionally graded SiAlON ceramics were produced by controlling the sintering conditions by two methods; powder bed and fast cooling. In powder bed method, β-SiAlON compacts were embedded in a two different homogeneously mixed powder bed compositions, which are α-SiAlON (100 wt%) and AlN: BN (50:50 wt%). The effect of powder bed composition and pressure on the diffusion was investigated. In

fast cooling method gradually change in compositions was obtained by controlling heat treatment schedule. Diffusion thickness changes in different methods were investigated by phase characterisation technique. Results were comparatively examined.

**960 (B1) Effect of different nucleation temperatures on the microstructural development of  $\alpha$ -SiAlON ceramics**  
S.R. KUSHAN, S. KURAMA, H. MANDAL, Anadolu University, Eskisehir, Turkey

$\alpha$ -SiAlON ceramics with elongated grains were previously observed in different studies. Sintering conditions are known to have a significant role on the microstructural development. By the nucleation treatment application during sintering,  $\alpha$ -SiAlON with needle-like microstructure can be achieved also in a nitrogen rich composition and utilizing commercial  $\alpha$ -Si<sub>3</sub>N<sub>4</sub>, whereas typical equiaxed grains are formed if the nucleation was not applied prior to growth in the same system. In this study, Ca-Ce containing multication system for two different compositions are chosen to combine the facility of Ce for elongated grain formation with the convenient separation of maximum rates for nucleation and grain growth of Ca. The effects of different nucleation temperatures are examined to understand the microstructural development behaviour of  $\alpha$ -SiAlON grains in this system.

**961 (B1) Microstructural evolution R- $\alpha$ -SiAlON ceramics (R=Y, Y+Sm and Sm)**  
S. KURAMA, H. MANDAL, Anadolu University, Eskisehir, Turkey

In the present work, Y, Sm and different atomic ratio of (Y/Sm) were separately used to explore the effect of rare-earth elements on the microstructural evolution and mechanical properties in  $\alpha$ -SiAlON ceramics. As expected, dual elements can reduce the eutectic point of the oxides, thus promoting the dissolution of  $\alpha$ -Si<sub>3</sub>N<sub>4</sub> and AlN. As is known, the difference of ionic radius of Y (0,93Å) and Sm (1,04Å) results in their different capability to form  $\alpha$ -SiAlON. Y<sup>+3</sup> can enter  $\alpha$ -SiAlON more easily. Sm<sup>+3</sup> enters  $\alpha$ -SiAlON with difficulty because of its big ionic radius and Sm- $\alpha$ -SiAlON is only stable at high temperature in response to its larger lattice vacancy along with the strenuous atomic vibration. According to results, Sm- $\alpha$ -SiAlON trend to form an elongated morphology. By increasing the Sm contents in the composition grains getting coarse. The elongated  $\alpha$ -SiAlON grains occurred in the Y-composition as well. Despite the formation of elongated  $\alpha$ -SiAlON in all compositions there

exists some differences in the size and aspect ratio of elongated grains. The Sm- $\alpha$ -SiAlON composition exhibits homogeny microstructure with high aspect ratio elongated grains and Y- $\alpha$ -SiAlON rather coarse morphology with low aspect ratio.

**962 (B1) Nucleation effect of different atomic ratio of R cation on the formation of  $\alpha$ -SiAlONs (R= Y, Ce/Y and Ce)**  
S. KURAMA, H. MANDAL, Anadolu University, Eskisehir, Turkey

Nitrogen rich different atomic ratio of dual Ce/Y doped  $\alpha$ -SiAlON composition has been prepared by gas pressure sintering. Microstructural characterization of the sintered materials resulted in typical coarse and equiaxed grain morphology. However, elongated  $\alpha$ -SiAlON grains were observed by applying two step sintering process. The effect of nucleation at 1600°C for 20 min. on the grain morphology and mechanical properties of  $\alpha$ -SiAlON ceramics are investigated.

**963 (B1) Formation of  $\alpha$ -SiAlON ceramics containing scandium**  
S. KURAMA, H. MANDAL, Anadolu University, Eskisehir, Turkey

$\alpha$ -SiAlON is able to accommodate cations into its crystal structure if the cations are sufficiently small in size, thus helping to reduce the volume of the remnant grain boundary phase after processing. Lutetium with an ionic radius of 0.85Å was the smallest 3+ cation which can be incorporated into  $\alpha$ -SiAlON structure and the Sc<sup>+3</sup> cation, with an ionic radius of 0.73Å was accepted too small to form an  $\alpha$ -SiAlON. In the present work, the possibility of having the Sc<sup>+3</sup> species as a dopant cation into  $\alpha$ -SiAlON structure has been investigated by using excess atomic ratio Sc<sub>2</sub>O<sub>3</sub> (at. % 25-75). X-ray diffractometry and energy dispersive X-ray measurements (EDX) analyses have proven that Sc<sup>+3</sup> cations can be accommodated into  $\alpha$ -SiAlON structure with elongated form.

**964 (B1) Mg<sup>+2</sup> and Ce<sup>+3</sup> doped  $\alpha$ -SiAlON: processing, microstructure and properties**  
S. KURAMA, H. MANDAL, Anadolu University, Eskisehir, Turkey

This paper investigated Mg-Ce doped  $\alpha$ -SiAlON. Mg and CeO<sub>2</sub> were used in 50:50 molar ratio as an additives. The mixture was sintered at 1830°C for 1 hour in gas pressure sintering furnace (GPS). The results show that sintered sample was composed of



Reference : **959**

Istanbul , 10.02.2003 11:10

E-mail : **hmandal@anadolu.edu.tr**

Dear N. **ÇALIŞ**,

On behalf of the Organizing Committee of the 8th Conference and Exhibition of the European Ceramic Society , we are pleased to inform you that your abstract, with the title and authors :

**Production of Functionally Graded SiAlON Ceramics by Controlling the Sintering Conditions**

Authors : **ÇALIŞ** , **KUŞHAN** , **MANDAL** , **0**  
**0** , **0**

has been accepted for a(n) **POSTER** presentation at the **8th ECerS Conference & Exhibition of the European Ceramic Society to be held between 29 June - 03 July 2003 at the Lutfi Kırdar Conference & Exhibition Center, Istanbul , TURKEY**

Your presentation has been scheduled in the **Engineering Ceramics & Composites B1** session.

Camera-ready manuscript preparation guidelines are enclosed.

The manuscripts must not exceed 4 pages including text and figures. The deadline for the receipt of the manuscript is 01 March 2003. Please strictly obey **the manuscript preparation guidelines** and also the **submission deadline** which is required by the publisher. All submitted manuscripts will be subjected to peer review and only the accepted ones will be published in the Key Engineering Materials (covered by Science Citation Index ). An original camera-ready manuscript with 2 copies should be sent to the Conference Secretariat including also an electronic version ( CD or floppy disk ).

Please use the reference number given in this letter in your future correspondences.

A hard copy of this letter will also be sent in mail including registration forms and detailed information concerning accommodation and travel. In addition, full content of the conference preliminary programme and registration & accomodation form will be soon available at the website <http://www.ecers2003istanbul.org>

Please do not hesitate to contact us if you have any queries regarding with preparation of your manuscript or attendance at the conference.

We look forward to meeting you where the continents meet.

Yours Sincerely,

**Prof. Dr. M. Lütfi ÖVEÇOĞLU**  
Scientific Programme Committee

**Prof. Dr. Hasan MANDAL**  
Scientific Programme Committee



Reference : **958**

Istanbul , 10.02.2003 11:08

E-mail : **fkara@anadolu.edu.tr**

Dear **N. ÇALIŞ** ,

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Paper Title : **Development of Laminar Type of Functionally Graded SiAlON Ceramics**

Authors : **ÇALIŞ** , **KUŞHAN** , **KARA** , **MANDAL**  
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Please use the reference number given in this letter in your future correspondences.

A hard copy of this letter will also be sent in mail including registration forms and detailed information concerning accommodation and travel. In addition, full content of the conference preliminary programme and registration & accomodation form will be soon available at the website <http://www.ecers2003istanbul.org>

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