

**92<sup>ND</sup>**  
ANNUAL  
MEETING

# ANNUAL MEETING ABSTRACTS

92nd ANNUAL MEETING AND  
EXPOSITION  
APRIL 22-26  
DALLAS, TEXAS

The American Ceramic Society, Inc.  
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**"Synthesis, II"**

ion Chair: Gary Messing, Pennsylvania State University, University Park, PA

**8:35-8:40 a.m. Introductory Remarks by Session Chair**

**8:40-9:00 a.m.—(49-SV-90)**

**SYNTHESIS OF SPHERICAL SiO<sub>2</sub> PARTICLES FROM THE SPONTANEOUS EMULSIFICATION OF PARTIALLY HYDROLYZED TEOS IN WATER, W. T. Minehan\* and G. L. Messing, The Pennsylvania State University, University Park, PA 16802**

A method for synthesizing spherical, submicron silica powders from the o/w emulsion of metal alkoxides has been developed. The emulsions are spontaneously formed upon mixing, without the aid of surfactants or other liquids usually associated with emulsion processes. The hydrophobic nature of partially hydrolyzed TEOS is controlled by the amount and type of catalyst and the concentration of water used in hydrolysis. Powders can be synthesized with a high surface area with average particle sizes ranging from 0.05 to larger than 5.0 μm diameter. The importance of interfacial tensions and phase equilibria in the TEOS-water-ethanol system and their effect on final particle size will be discussed.

**9:00-9:20 a.m.—(50-SV-90)**

**EFFECT OF B<sub>2</sub>O<sub>3</sub> ON THE MULLITIZATION OF ALUMINOSILICATE GELS,† S. Sundaresan,\* Department of Chemical Engineering, Princeton University, Princeton, NJ; I. A. Aksay, Department of Materials Science and Engineering, University of Washington, Seattle, WA.**

Diphasic aluminosilicate gels of mullite stoichiometry can be prepared quite readily from an aluminum salt and colloidal silica. Such a gel, upon heat treatment, manifests the crystallization of transitional alumina at 700-850°C, followed by mullitization at temperatures > 1200°C. It is known that the presence of a small amount of B<sub>2</sub>O<sub>3</sub> (2 wt %) in these gels can induce complete crystallization of a solid solution of mullite and aluminum borate at temperatures of 700-800°C. The primary role of B<sub>2</sub>O<sub>3</sub> in such systems is probed in the present study through DSC, XRD, and seeding experiments. It will be shown that the inhibition of the crystallization of transitional alumina is one of the key roles played by boric oxide.

†Work supported by 3M Corporation.

**9:20-9:40 a.m.—(51-SV-90)**

**SOL-GEL PREPARATION AND CHARACTERIZATION OF MULLITE, D.I. Mozano, J. Ito and M.A. Aguerter (\*), IFQSC, University of São Paulo, 13.560 SÃO CARLOS (SP), Brazil.**

Mullite (3Al<sub>2</sub>O<sub>3</sub>·2SiO<sub>2</sub>) has been obtained by a Sol-Gel process in which the sols were prepared by mixing aluminum sec-butoxide, TEOS, acetylacetone and isopropanol in neutral condition. We have studied the sols time evolution as a function of the concentration of acetylacetone, solvent and atmosphere contact area. Crystalline mullite were obtained by heat treatment in air at temperature as low as 980°C. The characterization of the gels and sintered materials have been done by RLL, DTA, XRD, microhardness and SEM techniques and a III diagram was determined. The same process allows the preparation of ceramics of various Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub> composition. Results will be presented.  
 Research supported by CNPq, FAPESP and FINEP (Brazil)

**9:40-10:00 a.m.—(52-SV-90)**

**SOL-GEL PROCESSING OF POTASSIUM NIOBATE, M.M. Amini and M.D. Sacks, University of Florida, Gainesville, FL 32611**

Potassium niobium double alkoxide, KNb(OC<sub>2</sub>H<sub>5</sub>)<sub>6</sub>, was synthesized by reacting niobium ethoxide and potassium ethoxide. Alkoxides were characterized by mass spectrometry (MS), nuclear magnetic resonance (NMR) spectroscopy, and Fourier transform infrared (FTIR) spectroscopy. Hydrolysis/condensation reactions were carried out using varying mole ratios of water/double alkoxide. Reaction products were characterized by thermal gravimetric analysis (TGA), differential thermal analysis (DTA), X-ray diffraction (XRD), and gas adsorption BET surface area measurements. Processing conditions which result in the formation of single-phase potassium niobate, KNbO<sub>3</sub>, were identified.

<b>Campo</b>	<b>Dado</b>
****	Documento 1 de 1
No. Registro	000806562
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Entrada Principal	Bozano, D F (*)
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Assunto	MATERIA CONDENSADA (PROPRIEDADES TÉRMICAS)
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