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ABSTRACTS

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surface of aragonitic monolits dandelion-like HA structures with diameter 3-8 μm were formed. With the prolonged HT treatment radially oriented nanoplates and nanorods were developed. The original porosity of bones was retained (~90%), while the specific surface area was increased from 2.5 to 8.5 m2/g.

CB:P14 **Aluminum Oxide Ceramics with Gradient Porosity Obtained by Commercial Starch Consolidation and Conformation**

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The starch conformation and consolidation is a technique commonly used for obtaining porous ceramics. In this technique starch is used as a bonding and porous-maker element. In this process the slip is previously put in an impermeable mould where the gelling occurs. The main difference of the method adopted in this paper compared with the traditional one is that a mould with a plaster porous base was used (consistency of 70 and 90) improving the water drainage by action of gravity and the capillarity effect. Porous aluminum oxide ceramics were obtained from slips with 50% of solids in volume using as precursors aluminum oxide A-1000SG and commercial cornstarch with a mass concentration varying from 10 to 40%. For comparison between the present method and the common one slips were put in impermeable and permeable base moulds. The gelling occurred at 700 Celsius for 2 hours and the drying at 110 Celsius. Pre-sintering was carried out at 1000 Celsius and the sintering at 1600 Celsius with a plateau of 1 hour. Results showed that the plaster consistency of the mould bases was preponderant on ceramics porosity. Porosity and apparent density measurements using optical and electron-microscopy revealed variation of 5% of porosity from the top to the bottom of the samples.

CB:P15 **New Methodology in Modeling Ceramics Morphology**

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The improvement of ceramic synthesis and processing methodology based on digital image processing and analysis of ceramic samples is in its initial stage. The main reason is that the models are based on poorly obtained data from sample's digital image processing. The lack of a solid statistical analysis and digital-imaging setup standardization make the method less useful that it should be if set in a sound basis. Therefore the importance of setting a new methodology in digital image processing for data acquisition on ceramic morphology analysis is essential for setting new models for customized ceramic synthesis and processing. The present paper shows results based on imaging by Scanning Electron Microscopy (SEM) of alumina ceramics obtained by pressing and starch consolidation methods. Observation of different sample's regions allowed a more accurate description of ceramic morphology. Plots of resistance to flexion versus porosity and its correlation with the grain size and shape allowed one to choose the best model for representing ceramic's morphology. Correlation of starch percentage with sample's porosity and mechanical resistance allowed the best experimental conditions for customized ceramic's performance.

CB:P17 **Preparation of Porous Silicon Nitride by Sacrificial Templating**

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High performance porous structural ceramics have been widely studied. Silicon nitride is an interesting material for this application because bodies with high mechanical strength, achieved as a result of "in situ" anisotropic grain grown, can be obtained. In this study, Si3N4 bodies with different porosity related aspects (percentage, size distribution, etc.) were obtained by changing the percentage (vol.%) and type of starch in the mixture as well as the sintering parameters. The porosity, apparent density (Archimedes method), microstructure (SEM) and the mechanical strength (in compression) of these bodies were determined. It was thus possible to relate the type and amount of starch with the porosity and mechanical properties of the bodies. The samples prepared using potato starch and rice showed the lowest and highest mechanical strength respectively.

CB:P18 **Influence of Binder on Porous Ceramic Properties Prepared by the Polymeric Sponge Method**

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Porous ceramic materials are used in both medicine and industry. Porous ceramics can be prepared in the form of a filter element or a thermal insulator, or may be as a composite element. Preforms of this type may be application only if they meet the structural requirements imposed. In order to obtain the porous ceramic material the polymeric sponge method was applied. It is a method involving the deposition of the ceramic slurry onto polymeric sponge. The polyurethane sponge of 70%, 80% and 90% open porosity fabricated by the Kureta company was used. Ceramic porous materials obtained on the basis of alumina Almatis with an average grain size > 0.5 um. Aqueous suspension was prepared using two types of binders, poly(vinyl alcohol) and dispersion based on methacrylic acid esters and styrene. The aim of this study was to explain the relationship between the composition of the weight slips, the conditions of sintering and obtained porous ceramics structure. In this paper the results of studies on rheological properties of ceramic slurries and strength tests of ceramic materials are presented.

CB:P19 **Mechanical Properties of Si3N4 - SiC Composites Sintered by the HPHT Method**

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In recent years, there has been considerable interest in the mechanical properties of ceramic nanocomposites. Nanopowders could theoretically be easier to densify in comparison with conventional, microstructured powders. On the other hand, in practice, some common problems with densification of nanopowders are known. The large specific surface area of nanograins causes a tendency to absorb a high amount of different gases and impurities. These impurities often contribute to the cracking of sintered nanomaterials. Another difficulty in the consolidation of particulate nanostructured materials is ensuring complete compaction while retaining the nanocrystalline structure. In the present work three types: micro-, submicro-, and nanostructured Si3N4-SiC composites have been obtained by High Pressure - High Temperature (HPHT) sintering. Density, Young modulus, hardness and fracture toughness have been measured. A strong influence of initial powder size on mechanical properties of Si3N4-SiC composites can be observed. HPHT sintered materials obtained from submicron powders are characterized by better mechanical properties than those obtained from micro- and nanopowders. Submicro-Si3N4-SiC composites have better hardness and fracture toughness than comparable commercial ceramics.

CB:P20 **Phosphate Bonded Alumina: Effect of Crystalline (AlPO4) Polymorph Phase Transformation on Mechanical Properties**

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Alumina and alumina matrix composites typically require sintering temperatures in excess of 1550 °C. The present study was motivated from the possible process flexibility and energy saving owing to the reduced sintering temperature with use of phosphate bonding of alumina. Aluminum phosphates have been known for their good bonding ability as illustrated from their use in refractories, in providing oxidation resistant coatings on carbon-carbon composites and bio-ceramics etc. While phosphate bonded alumina is unique in the ways mentioned above, its limitations include the presence of porosity in pressure less sintered samples leading to lowered strength and phase instability above approximately 1200 °C.This paper describe the different processing routes, effect of AlPO4 binder concentration and its polymorphs on hardness (Hv), Young's modulus (E), Transverse rupture strength (S) and Compressive strength (s) of PBA. In this study, ultra fine Al2O3 (particle size ≈0.5 μm) was reacted with H3PO4, mixed with tabular alumina (particle size ≈5 μm, α-Al2O3), compacted at pressure in the range of 96 - 288 MPa and heat treated at different temperatures in the range of 500 - 1280 °C to yield phosphate bonded alumina. Samples of PBA with different porosity and AlPO4 polymorph bonding phase obtained through heat treatment at different temperatures were characterized for their mechanical properties. The mechanical properties exhibited by the sintered PBA were found to be in the range of Hv=360-480 kg/mm2, E = 134-140 GPa, S = 72-112 MPa and σ = 220-320 MPa at the optimized processing conditions.

CB:P22 **Reactive Milling and Mechanical Alloying in Electroceramics**

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The main advantages of reactive milling and mechanical alloying are