Effects of pH, Surface Area, and Background Matrices on the Removal of Lead from Aqueous Solutions Using Activated Alumina

Authors: Patrick Wootton; AUBURN UNIV AL

Sampling Efficiency Measurement Methods for Aerosol Samplers

Authors: Jana S. Kesavan; Jerold R. Bottiger; Robert W. Doherty; EDGEWOOD CHEMICAL BIOLOGICAL CENTER ABERDEEN PROVING GROUND MD RESEARCH AND TECHNOLOGY DIR

Performance Characterization Methods of Aerosol Samplers

Authors: Jana S Kesavan; Robert W Doherty; Jerold R Bottiger; EDGEWOOD CHEMICAL BIOLOGICAL CENTER ABERDEEN PROVING GROUND MD

Metal Slurry Droplet and Spray Combustion

Authors: W. A. Sirignano; R. Bhatia; CALIFORNIA UNIV IRVINE DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

Development and Control of Porosity in Al2O3/AlPO4 Coatings

Authors: Larraine F. Francis; MINNESOTA UNIV MINNEAPOLIS DEPT OF CHEMICAL ENGINEERING AND MATERIALS SCIENCE

Fretting Wear-Resistant, Micro-Arc Oxidation Coatings for Aluminum and Titanium Alloy

Authors: K. J. Choppy; R. F. Kovan; B. M. Cushman; INFOSCITEX CORP WALTHAM MA

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micro-arc treated then ... cycles. The results of efforts to improve the fretting wear resistance of aluminum and titanium alloy bearings for use in aircraft gear box ...

**Holographic Investigation of Solid Propellant Combustion**

**Authors:** Albert G. Butler; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

... obtained from the holograms. From these data, the mean diameters (D32) of the larger particles were calculated and utilized to compare what effects pressure, location in the motor and aluminum content had on the behavior of the aluminum/aluminum oxide particles. D32 was found to decrease with increasing pressure, but was unaffected by variations in low values of propellant aluminum loading. D32 at the grain exit was found to be significantly less than within the grain port.

**Investigation of the Effects of Solid Rocket Motor Propellant Composition on Plume Signature**

**Authors:** Clay J. Snaza; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

Three propellants with aluminum/silicon weight percentages of 18/0%, 13.5/4.5%, and 12/6% were fired in a subscale motor to determine if the plume ... diameters (less than 1.93 micrometers) were present with any significant volume. Replacing a portion of the aluminum in a highly metallized solid propellant with silicon was found to eliminate the Al2O3 in favor of SiO2 ... smoke (particles with diameters less than 2 micrometers) they could account for only approximately 10% of the article volume. Solid rocket, Aluminum oxide, Infrared signature, Aluminum/Silicon propellant, Particle size distribution

**The Effect of Solid Propellant Binder on the Formation and Evolution of Aluminum Combustion Products**

**Authors:** V. E. Zarko; O. G. Glitov; V. V. Karasov; M. V. Becketead; BRIGHAM YOUNG UNIV PROVO UT

... and an energetic binder (EB) propellant. Both contained 18% aluminum and 37% coarse AP in order to provide very similar ... structures, and both propellants had essentially common burning rates. The aluminum combustion efficiency is higher and the characteristic agglomerate size is significantly ... show that similar sized agglomerates differ significantly in structure and aluminum content, and there is some indication of internal voids (i.e. ... to when they initially form at the surface. The size distribution of fine oxide particles was not dependent on either pressure or the propellant binder (...

**Processing of Nanocrystalline Nitrides and Oxide Composites**

**Authors:** Jackie Y. Ying; MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMICAL ENGINEERING

... began to investigate the chemical composition, specifically oxygen contamination, and sintering behavior of the nanocrystalline aluminum nitride synthesized in the forced flow reactor. Our initial results from these studies show that nanocrystalline aluminum nitride can be produced with high purity (<4 wt% oxygen), and that full densification ... achieved without the use of sintering aids. In addition, hot pressed compacts of nanocrystalline aluminum nitride show an unusual degree of texturing after sintering, which may make these materials interesting ...

**Structure and Properties of Aluminum Nitride and AlON Ceramics**

**Authors:** James W. McCauley; ARMY RESEARCH LAB ABERDEEN PROVING GROUND MD WEAPONS AND MATERIALS RESEARCH DIRECTORATE

A brief review of aluminum nitride and AlON ceramics is presented in the context of the pseudobinary aluminum nitride-aluminum oxide phase equilibrium system. AlION is the name applied to the nitrogen stabilized cubic spinel in this system, with a composition centered at 35.7 mole-percent AlN. First, the phase equilibria and crystal chemistry of these phases are presented, focusing on a constant anion oxynitride spinel model and the various phases, including polytropes, in this system. Then, a brief summary is given on the processing and ...

**Adhesion of HVOF Sprayed Diamond-Containing Nanostructured Composite Coating**

**Authors:** Maxim V. Kireiev; Ion Nemerenco; NATIONAL ACADEMY OF SCIENCES MINSK (BELARUS) DEPT OF MECHANICS AND TRIBOLOGY

In the present paper mechanical properties of HVOF sprayed diamonds-containing aluminum oxide composite coating have been investigated. Crystallographic and morphologic texture was measured. Diamonds nanoparticles may improve fracture resistance of aluminum oxide-based coating. Investigations of thermally sprayed coatings by the test revealed high accuracy speed and reliability of the test. It is also thought that the composite coatings will have better thermal conductivity and thermal shock resistance than that of aluminum oxide-based coatings.

**MACHINING OF REFRACTORY MATERIALS**

**Authors:** Michael Field; William P. Koster; John V. Gould; Norman Zlatin; METCUT RESEARCH ASSOCIATES INC CINCINNATI OH

... machining characteristics were determined for unalloyed tungsten, molybdenum, columbium and tantalum alloys, Rene 41, B-120VCA titanium, D6AC steel quenched and tempered to 52-58 Rc, Refrasi, Pyrocem, zirconium oxide and aluminum oxide coatings. The selection of this group, is the result of a field survey. This report presents the recommendations for machining these materials. It should be noted that even small deviations in cutting speeds, feed, cutting fluids, tool ...

**Template-Synthesis of Infrared-Transparent Metal Microcylinders: Comparison of Optical Properties with the Predictions of Effective Medium Theory**

**Authors:** James W. McCauley; ARMY RESEARCH LAB ABERDEEN PROVING GROUND MD WEAPONS AND MATERIALS RESEARCH DIRECTORATE

A brief review of aluminum nitride and AlON ceramics is presented in the context of the pseudobinary aluminum nitride-aluminum oxide phase equilibrium system. AlION is the name applied to the nitrogen stabilized cubic spinel in this system, with a composition centered at 35.7 mole-percent AlN. First, the phase equilibria and crystal chemistry of these phases are presented, focusing on a constant anion oxynitride spinel model and the various phases, including polytropes, in this system. Then, a brief summary is given on the processing and ...
Authors: C. A. Foss Jr.; M. J. Tierney; C. R. Martin; COLORADO STATE UNIV FORT COLLINS DEPT OF CHEMISTRY

Metal-insulator composites of varying metal volume fraction have prepared by electrochemical deposition of gold into porous, aluminum oxide membranes. The cylindrical pore array structure of the host oxide serves as a template for the formation of Au particles ca. 0.26 gm in diameter with lengths ranging from 0.3 gm to 3 gm depending on deposition time. The composites display a significant transparency in the infrared spectrum between 2000 and 4000 cm-1. The Au volume fraction and effective medium theory screening ...

Full Text

Controlled Heterogeneous Nucleation of Melt-Textured YBa2Cu3O6+x by Addition of Al2O3 Particles

Authors: Yan L. Chen; Lijie Zhang; Helen M. Chan; Martin P. Harmer; LEHIGH UNIV BETHLEHEM PA

alumina particles, it was found that nucleation and growth of 123 occurred exclusively at the particles. A reaction sequence for the formation of the Ba5y2A14015 is put forward, together with a discussion of the possible nucleation mechanisms for the 123. Yttrium Barium Copper Oxide(YBCO), Perlitic, Melt-texturing, Nucleation, Barium Yttrium Aluminum Oxide (Ba6y2A14015)

Full Text

Processing and Characterization of Porous Oxide Coatings

Authors: Lorraine F. Francis; MINNESOTA UNIV MINNEAPOLIS DEPT OF CHEMICAL ENGINEERING AND MATERIALS SCIENCE

The goals of this research project were to develop processing methods for fabrication of porous oxide coatings with a range of pore contents and to develop characterization methods for porous coatings. Research focused on controlling porosity in coatings prepared by ... three categories: (1) development and control of porosity in alkoxide-derived titania coatings; (2) characterization of macroporous coatings and (3) porosity in alumina/aluminum phosphate coatings. Two categories of results concern the development of new processing methods for ceramic coatings and the scientific understanding of ...

Full Text

High-Efficiency Heterojunction Photovoltaic Devices by Block Copolymer Nanotemplates

Authors: Jin K. Kim; Jeong I. Lee; Jeong A. Jang; Unyong Jeong; POHANG UNIV OF SCIENCE AND TECHNOLOGY (KOREA SOUTH) DEPT OF CHEMICAL ENGINEERING

... and poly (3-hexyl thiopene) (P3HT) nanowires with diameters of 10~25 nm were prepared on indium-tin oxide coated glasses (ITO) by electropolymerization of the monomers inside nanoporous templated prepared by block copolymers. These high density arrays ... polymer nanowires persisted without collapsing the wire onto the substrate. Such structures could not be achieved by the electropolymerization of a conducting polymer inside an anodized aluminum oxide (AAO) membrane, where the nanowires were found to fall onto the substrate after the AAO was removed. After removal of the PS matrix, the HOMO and ...

Full Text

A Comparison of Bulk Precipitated Cerium Oxide Powders and Cerium Conversion Coatings and the Influence of Hydrogen Peroxide on Their Formation (Preprint)

Authors: S. A. Hayes; P. Yu; T. J. O’Keeffe; J. O. Stoffer; MISSOURI UNIV-ROLLA

To better understand the role of hydrogen peroxide in the formation of cerium conversion coatings and precipitates, hydrated cerium oxide/hydroxide materials obtained from aqueous solutions have been characterized by thermogravimetric methods, X-ray diffraction, and scanning electron microscopy. Powders were prepared by precipitation with ... conversion coating and the cerium precipitates formed by using hydrogen peroxide as an oxidant. Lastly, the effect of hydrogen peroxide in the cerium conversion coating process is considered from the standpoint of corrosive attack on the aluminum substrates.

Full Text

Low-Cost Deposition Methods for Transparent Thin-Film Transistors

Authors: Benjamin J. Norris; OREGON STATE UNIV CORVALLIS

... MV/cm, 12,1713.5, 0.411%, and 17.37 hA/cm2, respectively. Additionally, ZnO TFTTs constructed using spin-coated HfO2 gate insulators possess electrical characteristics similar to those obtained with aluminum oxide and titanium oxide superlattice “ATO” gate dielectrics. A second objective of this dissertation is to demonstrate a novel photolithography processing method for ZnO TFTTs with critical dimensions as small as 25 7m. Lithography patterning of ...

Full Text

Grain Boundary Segregation and Stress Corrosion Cracking of Aluminum Alloys

Authors: J. A. Green; R. K. Viswanadham; T. S. Sun; W. G. Montague; MARTIN MARIETTA LABS BALTIMORE MD

Auger electron spectroscopy and chemical depth profiling by argon sputtering were employed to obtain the grain boundary segregation profiles of various aluminum alloys. Samples of both commercial (7075, 7050, and 7049) and high purity alloys based on the Al-Zn-Mg ternary in different heat treatments were examined ... Mg and Zn. In commercial alloys, however, the grain boundaries are depleted in the minor elements Fe, Cu and Si. AES spectra of oxide films formed on Al-Zn-Mg alloys indicate that the enhanced segregation along the grain boundaries results in a film rich in Mg. It is postulated that ...

Full Text

Scanning Photoacoustic Microscopy of Aluminum with Aluminum Oxide Roughness Standards and Rubber

Authors: R. L. Thomas; L. D. Favro; P. K. Kuo; D. N. Rose; D. Bryk; WAYNE STATE UNIV DETROIT MI

Thermal wave imaging of coated samples, surface geometries of homogeneous samples, and dispersed particles in rubber samples are presented and discussed. Preliminary results of color-encoding of images are encouraging. Further photothermal (infrared radiation) detection studies of the coated graphite samples are recommended, along with more detailed study of numerical analysis of surface roughness applications. Preparation of rubber samples containing layer defects is also recommended.

Full Text
X-Ray Diffraction Studies of Evaporated Gold Thin Films Deposited on Aluminum Nitride Substrates

Authors: Clifford B. Munns; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

X-ray diffraction was utilized to determine the root mean square (r.m.s) strains and average particle sizes in evaporated gold thin films on aluminum nitride substrates as a function of substrate surface condition prior to deposition. The substrate treatments evaluated were surface roughness, use of titanium and chromium interlayers, presence of an oxide layer on the substrate surface and vacuum conditions used during deposition. The Warren-Averbach method was utilized to obtain the r.m.s. strains and particle ...
Temporal Evolution of the LIBS Spectrum of Aluminum Metal in Different Bath Gases

Authors: Thuyan N. Piehler, Frank C. DeLuria Jr., Chase A. Munson, Barrie E. Homer, Andrew W. Miziolek; ARMY RESEARCH LAB ABERDEEN PROVING GROUND MD WEAPONS AND MATERIALS RESEARCH DIRECTORATE

The spectral emission of gas phase aluminum (Al) and Al oxide was measured during and immediately after exposure of a bulk Al sample to a laser-induced spark produced by a focused, pulsed laser beam (Nd:YAG, 10 ns pulse duration, 35 mJ/pulse λ = 1064 nm). The spectral emission was measured as a function of time after the onset of the laser pulse, and was also measured in different bath gases (air, N2, O2, and He).

ELECTROCHEMICAL BEHAVIOUR OF OXYGEN AND HYDROGEN PEROXIDE ON ALUMINUM, TANTALUM AND ZIRCONIUM ELECTRODES

Authors: G. Bianchi; G. Caprioglio; MILAN UNIV (ITALY)

The cathodic reduction of O and H2O2 on Al, Ta, and Zr was studied by means of a polarization cell and an electronic potentiostat. Al, Ta and Zr, although covered by an oxide layer, acted as cathode for the processes of O and H2O2 reduction. Overvoltage values and the polarization curves are listed. The results obtained on these 3 metals are compared with those previously obtained on Ti. Overvoltages for cathodic reduction of O decrease in the following order: Zr, Ta, Ti for acid; Al, Ta, Zr, Ti for neutral; and Zr, Ti, Ta for alkaline solutions. These results indicate that the dangers of...

EXPERIMENTAL INVESTIGATION OF COMPACT CHARGE IONIZATION

Authors: E. N. Petrick; O. K. Husmann; H. W. Szymanowski; CURTISS-WRIGHT CORP QUEHANNA PA

... tests to establish the materials least subject to attack by cesium, including emitter materials (tungsten, molybdenum, platinum), structural materials (nickel, stainless steel), electrical conductors (copper), and electrical insulators (aluminum oxide); (7) investigation of emitter heating techniques, with tests of an inductive technique (no internal connections) and of a direct heating technique; and (8) elimination of fuel handling problems.

SYNTHESIS AND PYROLYSIS OF METAL ALKOXIDES AS POTENTIAL REFRACTORY OXIDE COATINGS FOR GRAPHITE.

Authors: K.S. Mazdiyasni; C.T. Lynch; DIRECTORATE OF MATERIALS AND EXPLOSIVES RESEARCH AND DEVELOPMENT (GT BRIT)

... of hafnia and zirconia on graphite substrates by decomposition of the isopropyl and tertiary butyl alkoxides was in vestibulated. The infrared spectra of the isopropanoxide-zirconium and hafnium were obtained. Thorium isopropoxide infrared data were also obtained and the spectra compared with titanium and aluminum isopropoxides. The tertiary but oxides show more promise for coating applications because of their higher vapor pressures. The vapor pressures and decomposition temperatures of the zirconium and hafnium butoxides were studied. Preliminary data on the oxidation resistance to 1000 C of...

INTERACTION OF PROJECTILES AND COMPOSITE ARMOR

Authors: A. L. Florence; T. J. Ahrens; STANFORD RESEARCH INST MENLO PARK CA

... stress fields in the facing plate during the initial stages of impact and to determine deflections and bending moments during the later stages. In addition to this work on the mechanics of projectile-armor interaction, exploratory experiments were undertaken with a view toward establishing the dynamic mechanical properties of aluminum oxide, an important facing material.

DEVELOPMENT AND EVALUATION OF TRANSPARENT ALUMINUM OXIDE

Authors: William H. Rhodes; DAVID J. SELLERS; Arthur H. Heuer; Thomas Vasilos; AVCO MISSILES SPACE AND ELECTRONICS GROUP LOWELL MA AVCO SPACE SYSTEMS DIV

Polycrystalline alumina (Al2O3) possessing high total and in-line transmission in the visible range was prepared successfully by a combined high temperature hot forging and annealing operation. Transparency was found to be produced by a combination of several pore removal mechanisms active during deformation and primary recrystallization. A strong basal texture normal to the pressing direction was found for both deformation and recrystallization structures, and the high in-line transmission characteristics were thought to be due to a lowering of birefringent scattering because of this texture ...

Electrophoresis of Colloidal Biological Particles

Authors: John F. Lemp Jr.; Eugene D. Ashby; Edward O. Rideonour; FORT DETRICK FREDERICK MD

... kind of biological particles is uniform in a constant environment. The microscope electrophoresis techniques for mobility and isoelectric point determinations of microscopic particles (bacteria, suspended mammalian tissue cells, aluminum oxide particles, and polystyrene latex particles) and submicronograffiti (proteins and gelatin) are described. The information that can be obtained and the additives for modification of electrophoretic mobility ...

Studies of the Exhaust Products from Solid Propellant Rocket Motors

Authors: R. Dawbarn; M. Kinslow; ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AFS TN

... to determine the feasibility of conducting environmental chamber tests on the physical processes which occur when a solid rocket motor exhaust mixes with the ambient atmosphere. Of particular interest was the interaction between hydrogen chloride, aluminum oxide, and water vapor. The program consisted of three phases: (1) building a small rocket motor and using it to provide the exhaust species in a controlled environment; (2)
evaluating instruments used to detect and ...

**Determination of Effects of Designated Pollutants on Plant Species**  
Oct 1976  57 pages  
**Authors:** A. L. Granett; O. C. Taylor; CALIFORNIA UNIV RIVERSIDE AIR POLLUTION RESEARCH CENTER

... Vandenberg Air Force Base and were grown in greenhouses equipped with evaporative coolers with activated charcoal air filters. The missile products investigated were hydrogen chloride and hydrogen fluoride gases and aluminum oxide aerosols, alone and in various combinations of toxicants. The gases were generated by the volatilization of acid liquids into a hot air stream and the aerosols were generated using nitrogen gas to carry the particles ...

**The Effects of Designated Pollutants on Plants**  
Nov 1978  74 pages  
**Authors:** A. L. Granett; O. C. Taylor; CALIFORNIA UNIV IRRVINE

The phytotoxicity of hydrogen chloride (HCl) gas and aluminum oxide (Al2O3) particulates was studied in special plant exposure chambers. These pollutants were generated separately by diluting bottled gas or commercial alumina dust. In addition, generation was affected by open-burning of small pieces of solid rocket fuel. The characteristics of these burn products were investigated. Rocket fuel gases produced phytotoxic responses similar to that seen on plants exposed to commercial HCl gas.

**Lubrication with Naturally Occurring Double Oxide Films**  
Nov 10, 1982  60 pages  
**Authors:** M. B. Petterson; S. J. Calabrese; B. Stupp; WEAR SCIENCES INC ARNOLD MD

A study was conducted to evaluate the lubrication characteristics of double oxides which could occur naturally on high temperature bearing materials. Consideration was given to the double oxides of iron, nickel, cobalt, rhenium, osmium, molybdenum, tungsten, vanadium, chromium, copper, titanium, aluminium, boron, and niobium. A survey was conducted to obtain property data on such compounds and a number selected for evaluation. Primary consideration was given to the rhenates, molybdates, vanadates, borates, osmoniates, and chromates. Friction tests were run over the temperature range 26 to 650C ...

**STS-5 (Space Transport System-5) Fish Kill, Kennedy Space Center, Florida**  
Jan 1983  28 pages  
**Authors:** Joseph E. Milligan; Gene B. Hubbard; AIR FORCE OCCUPATIONAL AND ENVIRONMENTAL HEALTH LAB BROOKS AFB TX

... on-site investigation of any possible fish kill associated with STS-5 on 11 November 1982. Due to the acuteness of the fish kills and close association with time of launch, STS exhaust products, such as HCl and/or aluminum oxide were suspected as the cause. Other potential causes considered included diseases, parasites, mechanical interference with respiration, insufficient oxygen, trauma, temperature and pH changes, and exposure to other toxic substances. The conclusion was ...

**Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds**  
Dec 15, 1988  68 pages  
**Authors:** G. H. Meier; A. W. Thompson; PITTSBURGH UNIV PA DEPT OF MATERIALS SCIENCE AND ENGINEERING

... alloys and other selected intermetallic compounds. This program consists of two parts. The investigations involving oxygen are directed toward describing the conditions which must be achieved in order to have a continuous, protective Aluminium Oxide or Silicon dioxide scale developed on niobium-base alloys and compounds, and other selected intermetallics, at temperatures between 600 and 1400 C. The studies concerned with hydrogen effects are directed toward ...

**Computer Simulations of Epoxy Adhesive Monomer Interactions with Alumina Surfaces**  
Aug 1992  26 pages  
**Authors:** Michael S. Sennett; Walter X. Zukas; Stanley E. Wentworth; ARMY LAB COMMAND WATERTOWN MA MATERIAL TECHNOLOGY LAB

... An ongoing program in our laboratory seeks to elucidate the effect of aluminum oxide on the cure chemistry of epoxy adhesives. The project includes the use of molecular dynamics (MD) techniques to carry out real time simulations of the interaction of various epoxy adhesive monomers with idealized alumina surfaces. Adhesive monomers investigated include the diglycidyl ether of bisphenol A (DGEBA), a brominated form of DGEBA, dianodiphenyl sulfone (DDS) and methylene dianiline (MDA). Both crystalline and amorphous ...

**Emissivity of Rocket Plume Particulates**  
Sep 1992  44 pages  
**Authors:** Curtis D. Whisman; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

The optical properties of motor aluminum oxide are required inputs to current plume signature prediction codes, such as SIRRM. Accurate predictions are possible only if variations in the particle emissivity due to changes in particle size, contamination, and changing temperature, etc. are known. This investigation demonstrated a simplified method for determination of the emissivity of Rocket motor generated alumina. Plume particulate material was collected on tungsten alloy wire during motor firings. A DC circuit was used to resistively heat the ...

**Fiber Coating by Sputtering for High Temperature Composites**  
Oct 15, 1992  79 pages  
**Authors:** M. L. Emiliani; PRATT AND WHITNEY WEST PALM BEACH FL GOVERNMENT ENGINES AND SPACE PROPULSION

... examined as-sputtered Y2O3 coatings deposited onto various substrates to understand why this coating improves the toughness of Nb-reinforced TiAl. The option program study characterized tungsten and molybdenum coatings applied by hollow cathode magnetron sputtering, and aluminum oxide coatings applied by sol-gel processing. Sputtering, Coating, Debond, Composites fracture energy, Fracture toughness, indentation.
Template Synthesis of Metal Microtubule Ensembles Utilizing Chemical, Electrochemical, and Vacuum Deposition Techniques

Jan 3, 1994 37 pages

Authors: Charles J. Brumlik; Charles R. Martin; Vinod P. Menon; COLORADO STATE UNIV FORT COLLINS DEPT OF CHEMISTRY

... microtubules. Four procedures for preparing metal microtubules are described in this paper. The general approach, called template-synthesis, entails using the pores in a microporous membrane as templates for forming the tubules. Microporous anodic aluminum oxide membranes and nuclear track-etch membranes are used as the template membranes. Gold and silver microtubules are made with outer diameters as small as 200 nm. These microstructures are characterized by scanning electron ...

Effect of Surface Condition on Strength and Fatigue Behavior of Alumina Ceramic

Nov 1993 90 pages

Authors: NAVAL COMMAND CONTROL AND OCEAN SURVEILLANCE CENTER RDT AND E DIV SAN DIEGO CA

... , in an effort to attain the appropriate strength and buoyancy characteristics, is investigating the suitability of ceramics. The vessels typically consist of cylindrical sections and hemispherical end caps of a ceramic such as aluminum oxide (alumina), which are joined together via metallic rings made of a titanium alloy Tests of such vessels have shown that fatigue cracks may arise in the alumina during submergence-emergence cycles, which ultimately ...

Template Synthesized Nanoscopic Gold Particles: Optical Spectra and the Effects of Particle Size and Shape

Jan 25, 1994 43 pages

Authors: Colby A. Foss Jr.; Gabor L. Hornyak; Jon A. Stockert; Charles R. Martin; COLORADO STATE UNIV FORT COLLINS DEPT OF CHEMISTRY

We have prepared nanoscopic gold cylinders of controlled radius and aspect ratio via electrodeposition of the metal within the pores of anodically- grown porous aluminum oxide membranes. The nanocylinder radii are determined by the pore dimensions of the host alumina which, in turn, depend on anodization conditions. The particle aspect ratios were controlled by varying the amount of Au deposited within the pores. The optical spectra of the gold nanocylinder/ alumina composites ...

Validation and Implementation of Optical Diagnostics for Particle Sizing in Rocket Motors

Dec 1993 45 pages

Authors: Paul V. Gomes; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

Aluminum oxide (Al2O3) particles of known size distribution were cast into a solid propellant which burned at temperatures less than the melting point of Al2O3. Thus, particles of known size distribution existed at the nozzle inlet and in the plume. Malvern particle sizing instruments were used to make measurements at these two location using a windowed subscale motor and the results were compared to the known distribution. In the motor, measurements were limited due to disruptive flow from the window purge gas. However, the unaffected larger modes were properly measured. In the plume, ...

Processing and Characterization of Mechanically Alloyed NiAl-Based Alloys

Jul 20, 1994 85 pages

Authors: Marek Dollar; Philip Nash; Stanislaw Dymek; Seung Joong Hwang; Sung-Jae Suby; ILLINOIS INST OF TECH CHICAGO DEPT OF METALLURGICAL AND MATERIALS ENGINEERING

... alloying of powders followed by hot extrusion has been used to produce NiAl-based materials. The technique is capable of producing fully dense, free of cracks, fine grained materials containing a bimodal distribution of aluminum oxide dispersoids. The mechanically alloyed materials produced in our laboratory are much stronger at both ambient and elevated temperatures and significantly more ductile than their cast counterparts. Minimum creep rates in the MA NiAl are ...