Effect of Fiber-Reinforced Plastic Strength Properties on the Ballistic Performance of Ceramic Composite Armor

Authors: James F. Mackiewicz; Gary Proud; ARMY SOLDIER AND BIOLOGICAL CHEMICAL COMMAND NATICK MA SOLDIER SYSTEMS CENTER

... a range of weak to relatively strong panels in term of flexural strength, shear strength and elastic modulus. The low resin and corresponding low strength laminates yielded the most efficient armor systems when tested in conjunction with Aluminum Oxide (Al2O3) frontal ceramic component versus the 7.62 mm M80 Ball and .30 cal Armor Piercing projectiles. Although the 5.3% resin laminates possess very low flexural and shear strengths, the data indicates ...

Investigation of Exothermic Grinding Sludge Produced from Watervliet Arsenal Gun Steels, Andersol Water-Based Cutting Fluid and Cincinnati Milacron Aluminum Oxide Resin Bond

Grinding Wheels

Authors: Samuel Sopok; Mark Fleszar; John Senick; ARMY ARMAMENT RESEARCH DEVELOPMENT AND ENGINEERING CENTER WATERVERLIT NY BENET LABS

The Advanced Technology Branch of Benet Laboratories, at the request of the Watervliet Arsenal Fire House, was tasked with the investigation of a Watervliet Arsenal exothermic grinding sludge. An on-site review of this grinding process showed that the grinding sludge apparently smoldered up to twenty-four hours after its production. In addition, within an hour, the sludge quickly reached a surface temperature that would cause a burn upon physical contact. At least one fire directly resulted from the inadvertent mixture of this sludge with a combustible material. Thermogravimetric analysis and ...

Evaluation of Materials for Rapid Runway Repair

Authors: Michael Riley; CERATECH INC BALTIMORE MD

... products are magnesia/alumina based, but are irregular shaped ground particulates. To add stiffness and additional compressive strength to the product, we will investigate the role of chopped ceramic fibers as low weight additives to the formula. Specifically, this task will focus on the use of discontinuous aluminum oxide fibers that have been designed to withstand temperatures as high as 1700 degrees C.

Heat Flux and Infrared Spectral Measurements of Burning SRM Propellant (Preprint)

Authors: Marty Venner; James Parker; William McKeon; AIR FORCE RESEARCH LAB EDWARDS AFB CA PROPULSION DIRECTORATE

... during a nominal portion of the burn and supports a classification of 1.4. A Fourier Transform Infrared (FTIR) spectrometer collected data over a spectral range of 1.4 - 14 micrometers. Those data show strong gaseous emissions from carbon dioxide, water, and hydrogen chloride as well as a continuum emission component due to the aluminum oxide particulates.


Authors: Michael S. Mason; Tieshu Huang; Robert G. Landers; Ming C. Leu; Gregory E. Hilmas; MISSOURI UNIV-ROLLA DEPT OF MATERIALS SCIENCE AND ENGINEERING

A novel, solid freeform fabrication method has been developed for the manufacture of ceramic-based components in an environmentally friendly fashion. The method is based on the extrusion of ceramic slurries using water as the binding media. Aluminum oxide (Al2O3) is currently being used as the part material and solids loading as high as 60 vol. % has been achieved. This paper describes a novel manufacturing machine that has been developed for the ...

Freeze-Form Extrusion Fabrication of Alumina Components Using Aqueous Paste

Authors: Tieshu Huang; Michael S. Mason; Gregory E. Hilmas; Ming C. Leu; MISSOURI UNIV-ROLLA DEPT OF MATERIALS SCIENCE AND ENGINEERING

Freeze-form Extrusion Fabrication (FEF) is an environmentally friendly solid freeform fabrication method that uses aqueous pastes to fabricate ceramic-based components. The process uses only small quantities (2 to 4 vol.%) of organic binder. Using the FEF process, 3-D ceramic components have been fabricated from aluminum oxide (Al2O3) by extrusion deposition of Al2O3 paste in a layer-by-layer manner utilizing a 3-D gantry controlled
Crested Tunnel Barriers for Fast, Scalable, Nonvolatile Semiconductor Memories (Theme 3)  
Dec 2006  14 pages  
Authors: Konstantin K. Likharev; Tsao-Ping Ma; STATE UNIV OF NEW YORK AT STONY BROOK  
... that may potentially replace DRAM as the main random access memories of semiconductor electronics. With that objective, we have combined the expertise at Stony Brook University in crested barrier technology (Prof. Konstantin Likharev) and aluminum oxide layer growth (Prof. James Lukens, Dr. Vijay Patel) with that of Yale University (Prof. T.P. Ma, Dr. X. Wang) in jet vapor deposition of silicon nitride and silicon dioxide films, as well as ...  
Full Text
THE STRUCTURAL-KINETIC INVESTIGATION OF THE PROCESS OF OXIDATION OF NICKEL, CHROME, AND ALLOYS BASED UPON THEM

Authors: D. V. Ignatov; R. D. Shangunova; FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OH

... the speed of oxidation of chrome at temperatures of 800 - 1000C. The oxide films originating on this alloy consist at 400C of oxide - nickel (NiO); at 500 - 700C they consist of oxide of chrome (alpha - Cr2O3); at 800 - 1000C - ... the spiral type of (NiCrO4). That of the inside layer consists of oxide of chrome (alpha - Cr2O3). The speed of oxidation of the nickel-chrome alloy decreases with additions of aluminum. For a satisfactory protection of the alloy Ni-Cr from oxidization up ... 5% suffices and at 1000C, 7% suffices. Oxide films forming on alloys with 1% of aluminum with 4.18% A1, 7.22% A1 ...

Contact Resistance and Stability Analysis of Aluminum-Based Thin Film Transistors

Authors: Celia M. Hung; OREGON STATE UNIV CORVALLIS DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

... assessment. Determination of the contact resistance of indium tin oxide (ITO) on two wide-band gap semiconductors, ... oxide (ZnO) and indium gallium oxide (IGO), is attempted and the effects of contact resistance ... systems are employed: ZnO on SiO2, ZnO on aluminum oxide (ATO), and IGO on SiO2. ... applied to 3 semiconducting materials: ZnO, zinc indium oxide (ZIO), and IGO, using thermal silicon oxide as the gate dielectric. Relatively stable devices are obtained after post-deposition annealing ... TFT fabricated using a spin-coat synthesized aluminum phosphate (AlPO) as the gate dielectric is also ...

Infiltration Kinetics and Interfacial Bond Strength of Metal Matrix Composites

Authors: Glen R. Edwards; David L. Olson; COLORADO SCHOOL OF MINES GOLDEN CENTER FOR WELDING AND JOINING RESEARCH

... was experimentally established for the infiltration of SiC particulate by liquid aluminum. Experimental wettability studies were completed for aluminum-silicon, ... in contact with SiC by utilizing a capillary rise apparatus. The oxide layers on the ceramic substrate and on the molten metal surface ... then provided relative estimates of bond strengths for several alumina alloys in contact with silicon carbide. Concepts from surface ... a surface reaction monolayer was sufficient to cause wetting. Aluminum matrix composite processing using the liquid metal route is complicated by the oxide barrier ...

TRANSISTOR, VHF SILICON POWER (5W)

Authors: P L McGough; RADIO CORP OF AMERICA SOMERVILLE NJ

... diode; however, improvement is still required in the defining and etching of the aluminum. In the fabrication of the insulating layer, the main difficulty is one of opening the emitter oxide area after anodizing or silicon monoxide evaporation. The difficulty ... to the sub state resulting in lifting during immersion of the wafer in oxide etch. Devices with only a few percent of the emitter areas ... diode charac teristics. These results indicate the feasibility of the anodized aluminum approach to the fabrication of an overlay structure. Alternate approaches for producing the ...

Preparation and Properties of Some Alumina-Chrome Refractories

Authors: T. Davies; H. G. Emblem; C. S. Nwobodo; A. A. Oyewu; V. Tsantatzou; UNIVERSITY OF MANCHESTER INST OF SCIENCE AND TECHNOLOGY UNITED KINGDOM

... densification and change in corundum lattice dimensions in sintered compacts made from chromium(III) oxide/ aluminum(III) oxide mixtures were evaluated in a study of some alumina-chrome refractories. High-energy milling using ... corundum lattice dimensions decreasing with 7 wt% chromium(II) oxide, other compositions giving lattice expansion. The ... alumina-chrome refractories containing 5 to 12 wt% chromium(II) oxide was also minimal at 7 wt% CHROMIUM(III) oxide. The composition of this series is typical of ethyl silicate-bonded alumina-chrome refractories used in the steel industry.

Bondability of Ti Adherends

Authors: B. M. Ditchek; K. R. Breen; J. D. Venables; MARTIN MARIETTA LABS BALTIMORE MD

... divided into three groups according to similarities in their oxide morphologies: Group I exhibits little surface roughness; ... extensive porosity and microroughness, similar to features found on aluminum prepared by the phosphoric acid anodize process. Wedge ... II. Hence, a direct correlation exists between oxide morphology and bond durability for Ti adherends. We found similar evidence for the importance of oxide morphology to the properties of bondments in our prior work ... effects of moisture. We conclude, therefore, that the combination of oxide stability and micro-roughness that can be developed on ...
Effect of Damage Processes on Spallation Life in Thermal Barrier Coatings

Authors: Golam Newaz; WAYNE STATE UNIV DETROIT MI

... inner metallic bond coat layer that provides needed oxidation resistance to the underlying superalloy. The microstructure of the bond coat changed from high aluminum concentration beta-(Ni, Pt)3Al phase, which has a very good oxidation resistance, to beta-(Ni, Pt)3Al during the thermal test in air. The microstructure change influenced the oxidation behaviors of the bond coat. Less protective oxide (Ni-rich) formed on gamma-(Ni, Pt)3Al due to depletion of aluminum, and the oxide scale on gamma2-(Ni, Pt)3Al has less adhesion to the bond coat. The TGO Layer and bond coat was subjected to high residual ...

Distributed Combustion in Solid Propellants

Authors: M. W. Beckstead; K. P. Brooks; BRIGHAM YOUNG UNIV PROVO UT DEPT OF CHEMICAL ENGINEERING

... an improvement over previous models. Law's model of aluminum combustion has been modified to include the effects of multiple oxidizers and their products, oxide accumulation on the surface of the burning aluminum particle, and convection. There are no adjustable parameters in the improved aluminum combustion model, and both transport and experimental data from a simple liquid droplet model. The aluminum combustion model has also been coupled to ... The results show reasonable agreement with available data for aluminum particles burning in the Rijke burner. ... Unstable combustion, ...

Weldability of Heat-Resistant Material SAP by Method of Fusion

Authors: G. D. Nikiforov; S. N. Zhiznyakov; JOINT PUBLICATIONS RESEARCH SERVICE ARLINGTON VA

Technology was developed for manufacture of SAP, possessing the ability to be welded by the method of fusion, and also technology of its argon-arc welding. Of all existing aluminum alloys, sufficient strength at a temperature of 350 - 5000 0 can be preserved only by material from sintered aluminum powder (SAP), the strengthening phase in which is oxide of aluminum. Basic initial product for obtaining SAP is finely-dispersed aluminum powder which is obtained by atomization of liquid aluminum with compressed air, with subsequent crushing in ball mills in an oxidizing atmosphere.

OXIDATIVE DETONATIONS INITIATED BY HIGH VELOCITY IMPACTS

Authors: A. P. Caron; NORTHROP SPACE LABS HAWTHORNE CA

... 25 and 0.30 mm thick) retaining oxygen at one atmosphere have been observed to burst when impacted with steel and aluminum spheres (3.2 mm diameter) at velocities 5.8 and 6.3 Kn/sec, respectively. Visible deposits of aluminum and iron oxide, target sheet bulges, strong light intensities, and pressure gauge traces of detonation waves indicate that the bursting pressures were caused by the violent oxidation of steel and aluminum. Evidence of such reactions were detected over a wide range of impact velocities (4.88 to 8.02 Kn/...
due to a lower activation energy for climb in aluminum. The formation of the slip step results in a lattice strain surrounding the step. This strain occurs regardless of the presence of an oxide layer. This strain may be the cause of slip-step height saturation.

**Dislocation Transport of Oxygen During Fatigue Crack Growth**

**Authors:** John W. Swanson; AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH

... indicated for Monel 404 and commercially pure titanium. Little increase in growth rate is observed for aluminum 7075-T651 and 2219-T87 alloys. Enhanced concentration of oxygen in the metal matrix ... to a vacuum environment is indicated for Monel 404, commercially pure titanium, aluminum 7075-T651 and aluminum 2219-T87. This is consistent with a dislocation transport mechanism. Sample roughness appeared to ... A rough estimate of dislocation transport depths of 125 to 600 A is made based on expected oxide thickness. The fracture surfaces from oxygen and vacuum environments appear the same for each ...

**Surface Quality Impact of Replacing Vapor Degreasers with Aqueous Immersion Systems**

**Authors:** C. Kodres; D. Polly; T. Hoffard; G. Anguiano; ENVIRONMENTAL PROTECTION AGENCY CINCINNATI OH RISK REDUCTION ENGINEERING LAB

... of aqueous immersion degreasing and vapor degreasing for removing contaminants from an aluminum surface are compared. Intentionally soiled, artificially weathered 7075 aluminum panels are degreased and then either anodized or chemically conversion coated. The quantity and ... to have no effect on the performance of anodized or chemically conversion coated aluminum surfaces. Performance is assessed in terms of resistance to both corrosion and abrasion and on the integrity of the oxide coating. The subsequent light duty immersion cleaning and pickling removes ...

**Non-Destructive Evaluation of Adhesive Bonded Structures Using Dielectric Methods**

**Authors:** Richard Pettit; STRATHCLYDE UNIV GLASGOW (UNITED KINGDOM)

... contractor shall characterize the dielectric signature of the hydrated lightly coated oxide surface, and investigate the effect of various solvent systems on ... The contractor shall characterize the aging of boron fiber/epoxy aluminum bonded structures taking into account that the electrical ... result the approach to measurements used with either the carbon fibers or the aluminum structures is not appropriate with these structures. An electrode ... years. Boron fiber composites are used in repair of damage on the skins of aluminum fabricated aircraft. This study will demonstrate the usefulness of the ...

**The Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon**

**Authors:** Aijun Yin; Marian Tzolov; Jimmy Xu; BROWN UNIV PROVIDENCE RI DEPT OF ENGINEERING

... unprecedented uniformity on silicon. The formation of highly ordered nanotube array by anodization of thick aluminum evaporated on a nonconductive substrate such as silicon is made possible through a specially designed process for evaporating thick aluminum of high quality and good adhesion.

**The Development of Heat-Resistant Paints for Metals**

**Authors:** R. W. Lilget; SOUTHWEST RESEARCH INST SAN ANTONIO TX

Coatings produced from zinc oxide and polyphosphoric acid did not resemble those produced from zinc oxide (ZnO), dimethyl hydrogen phosphate (DMHP), and ethyl acid phosphate (EAP). Coatings (ZnO-DMHP-EAP) cured above 55% relative humidity at 100 deg F were water resistant but not heat resistant, while those cured below 55% ... When the ZnO-DMHP-EAP coating material was dissolved in DMHP and the solution was applied to Al, a crusty layer was obtained. When the crust was removed, a surface coating remained that was heat resistant, water resistant, coherent, hard, and firmly bound to the aluminum.

**Vapor Phase Impregnation of Active Carbons**

**Authors:** D. M. Andrews; COMMONWEALTH SCIENTIFIC CORP ALEXANDRIA VA

... means for producing carbons having increased protection against toxic agents. Processes were developed for the vapor impregnation of carbon with cupric oxide, chromium trioxide, aluminum chloride, and platinum. Spectrographic analysis of impregnated samples indicated that impregnants were present on these carbons in ...

**Optical Constants**

**Authors:** M. R. Query; MISSOURI UNIV KANSAS CITY

... spectral regions. The optical constants of the materials were determined by use of Kramers-Kronig methods.

**A Study of the Microstructural Basis for the Strength and Toughness Properties of Water-Quenched and Air-Cooled HSLA-100, HSLA-100 with Increased Copper, and a ULCB Steel**

**Authors:** Thomas C. Mohr; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

... using the optical microscope, SEM, and TEM. The HSLA-100 with increased copper steel was adequately calcium treated and aluminum deoxidized as evidenced by the low sulfur content, few MnS stringers, and lack of large oxide arrays. The ULCB steel was not calcium treated or Al-killed; nor was it thermo-mechanically

http://www.stormingmedia.us/search.php?q=Aluminum+Oxide&search_x=11&search_y=... 4/30/2010
processed as shown by the lack of lipped, broken, or elongated stringers. Both MnS and oxides inclusions were present, and consequently, ladle metallurgy would have to be used before the ULCB steel was ...

**Electrochemical and Spectroscopic Studies of Molten Halides**  
*Authors: Gleb Mamantov, TENNESSEE UNIV KNOXVILLE DEPT OF CHEMISTRY*  
*Jan 8, 1993  76 pages*

... chemistry and electrochemistry in molten halides, media which are used in the production of several important elements, such as aluminum, magnesium and fluorine, in some high energy battery systems, as well as in other applications ... is caused by atmospheric contaminants. Even the parent alkali chloroaluminates contain millimolar quantities of complexed oxide which may result from the interaction of some melts with Pyrex glass. Therefore, studies of solute species at typical electrochemical or spectroscopic concentrations should take into account the presence of oxide species wherever possible.

**Carbonate Treatment of U3O8 Precipitates**  
*Authors: Gilman Y. Murray, John Dasher, MASSACHUSETTS INST OF TECH CAMBRIDGE MINERAL ENGINEERING LAB*  
*Jun 21, 1948  25 pages*

... acid. The 803 in the resulting leach solution can then be precipitated with any one of several alkalies such as sodium hydroxide, ammonia, calcium oxide, or magnesium oxide. A precipitate of most desirable characteristics is obtained by using magnesia as the precipitant, but this precipitate will settle to only 10 per cent ... to 35 per cent water of hydration. The oven-dried product usually contains from 2 to 3 per cent 803, and greater percentages of iron, aluminum silicon and magnesium. This cake contains about 150 pounds of water per pound of 803. If dried it would contain 30 pounds of other ...

**Center for Non-Stoichiometric Semiconductors**  
*Authors: Umesh K. Mishra, CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING*  
*Sep 2000  68 pages*

... (FETs) providing increased breakdown voltages and a reduced noise performance. In recent years the research has been redirected into the newly emerging area of oxides and oxide electronics. Oxide produced from the steam oxidation of aluminum containing semiconductors has found widespread applications in the area of opto-electronics, specifically in vertical cavity lasers. In the research performed under the PRET program, additional applications in ...

**Applications of New Chemical Heat Sources Phase 1**  
*Authors: William L. Bell, Robert J. Copeland, Amy L. Shultz, TDA RESEARCH INC WHEAT RIDGE CO*  
*Jan 2001  66 pages*

... By a process of elimination, using data on materials costs, reaction rate studies, and calorimetry to measure heat output, we selected the best reactions for ration heaters. The best material: identified are the combination of aluminum chloride with calcium oxide (AlCl3/ CaO) and diphosphorous pentoxide with calcium oxide (P2O5/CaO). Either can provide the same heat as the FRH with a small increase in weight, and does not produce any hydrogen. Our overall ...

**Laser Cladding on Carbon-Carbon Composites**  
*Authors: John J. Eric, Robert J. Hull, AIR FORCE RESEARCH LAB WRIGHT-PATTERSON AFB OH MATERIALS AND MANUFACTURING DIRECTORATE*  
*Dec 2002  45 pages*

... where it is focused to an approximately 1.3-cm-diameter spot size. Most of the test cases used 6 kW/sq cm to clad the coating material to the substrate surface. Coating materials included powdered aluminum, nickel chromium alloy, gray alumina ceramic, and a magnesium oxide/zirconium oxide ceramic. Mixed results were obtained, with the alumina providing a slightly better cladding, based on visual appearance and micrographic views.

**Extrusion Based Processing of Ti Alloys: Feasibility Study**  
*Authors: Joe Cochran, Dave McDowell, Kon J. Lee, GEORGIA INST OF TECH ATLANTA SCHOOL OF MATERIALS SCIENCE AND MECHANICAL ENGINEERING*  
*Dec 2003  19 pages*

... of this program, honeycombs with square prismatic cells were fabricated by extrusion of titanium oxide powder and experiments were conducted to convert the sintered honeycomb to metallic ... These tests focused on kinetics of titanium reduction because high specific surface area oxide performs can be fabricated using technology developed by the lightweight structures group at ... honeycomb reduction studies, dendritic electrodeposition of titanium was observed to be occurring similar to the Hall process for aluminum. Thus, a series of tests were conducted to determine if high purity titanium could ...

**Lightweight, High-Strength, Age-Hardenable Nanoscale Materials**  
*Authors: Vijay K. Vasudevan, Jainagesh A. Sekhar, CINCINNATI UNIV OH DEPT OF CHEMICAL AND MATERIALS ENGINEERING*  
*Mar 25, 2004  28 pages*

Phase transformations and precipitation behavior in age-hardenable nanoscale materials, using binary aluminum alloys as model materials, were studied. Nanoparticles of Al-Cu and Al-Zn were synthesized by a ... nm dia) were found to be supersaturated f.c.c. and were enveloped by a 2-4 nm amorphous Al oxide layer. On aging the Al-Cu nanoparticles, a precipitation sequence comprising nearly pure Cu precipitates to theta’ to the ... the results revealed that Al nanopowders could be processed into bulk structures, leading to interesting Al-Al oxide nanocomposites with full densification and high hardness.

**Pulser Laser Deposition of Transparent Conducting Thin Films on Flexible Substrates**  
*Authors: Heungsoo Kim, DEPARTMENT OF THE NAVY WASHINGTON DC*  
*Jan 19, 2001  21 pages*

The invention relates to the deposition of transparent conducting thin films, such as transparent conducting oxides (TCO) such as tin doped indium oxide (ITO) and aluminum doped zinc oxide (AZO) on flexible
substrates by pulsed laser deposition. The coated substrates are used to construct low cost, lightweight, flexible displays based on organic light emitting diodes (OLEDs).

**Field Effect Controlled Photoreisitors Based on Chemically Deposited PbS Films**

Jan 2002 6 pages

Authors: Eugenia Pentia, Lucian Pintilie, Ion Matei, Ioana Pintilie

**BERYLLIUM EROSION CORROSION INVESTIGATION FOR SOLID ROCKET NOZZLES**

Jun 1967 445 pages

Authors: W. L. Smallwood, PHILCO-FORD CORP NEWPORT BEACH CA SPACE AND RE-ENTRY SYSTEMS DIV

**CORROSIVE INFLUENCE OF DIPHENYL ON METALS AND OXIDES (KORROZIONNOE VOZDEISTVIE DIFEENILA NA METALLY I OKISLY)**

Sep 12, 1967 22 pages

Authors: Yu. F. Bychkov, L. D. Laptev, A. N. Rozanov

**Physical and Chemical Characterization of Fog Oil Smoke and Hexachloroethane Smoke**

Jan 1980 128 pages

Authors: Sidney Katz, Alan Snelson, Raleigh Farlow, Roger Welker, Stephen Mainier

The U.S. Army HC smoke generator has been studied, the investigation including the reagent materials, generation process, and the product gases and aerosol smoke. The reagent material consisted of hexachloroethane, zinc oxide, aluminum. In a series of chamber tests, variations in material composition did not appear to affect the characteristics of the product smoke, but small variations in the aluminum concentration did control the rate of the smoke generating reaction.