Abstracts

Patents

in-force

CSIR-Central Glass and Ceramic Research Institute
Kolkata-700032

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सीएसआईआर - केन्द्रीय कॉच एवं सिरामिक अनुसंधान संस्थान
196, राजा एस. सी. मल्लिक रोड, कोलकाता - 700032, भारत
CSIR-Central Glass & Ceramic Research Institute
(An ISO 9001 : 2015 Certified Institute)
196 Raja S C Mullick Road, Jadavpur, Kolkata 700 032, India

डॉ. के. मुरलीधरन
निदेशक
Dr. K. MURALEEDHARAN
DIRECTOR

MESSAGE

Patents are the key link between knowledge and product. They are instrumental in enabling translation through innovation, and its appropriate monetization. A well designed patent portfolio leverages an institution's market positioning.

CSIR-CGCRI has a good presence in CSIR's patent landscape with close to 75 in-force patents as on date. On an average, the institution files 5-7 patents annually and currently have a spread across 15 international jurisdictions other than India. The patents cover diverse fields of materials science such as fibre optics, fuel cells, functional materials, bio-ceramics, non-oxide ceramics, coatings & composites and ceramic membranes to name a few.

As a part of an exercise to disseminate the institute's technological portfolio to stakeholders, a synopsis of all the in-force patents of CSIR-CGCRI has been compiled in this booklet. I am sure that this information would prove useful to anyone who is interested to explore the institute knowledgebase so as to enhance their own technological prowess.

I welcome suggestions to improve this compilation further.

Dated : 20/07/2020

(K. Muraleedharan)

निदेशक सचिवालय / Director's Secretariat : +91 33 2473 5829 / 2483 9241
कार्यालय के फोन / CGCRI Office Phone : +91 33 2473 3469 / 3476 / 3477, फैक्स / Fax : +91 33 2473 0957
ई-मेल / E-MAIL : director@cgcri.res.in ; muralee@cgcri.res.in, वेनदेशक / Website : www.cgcri.res.in

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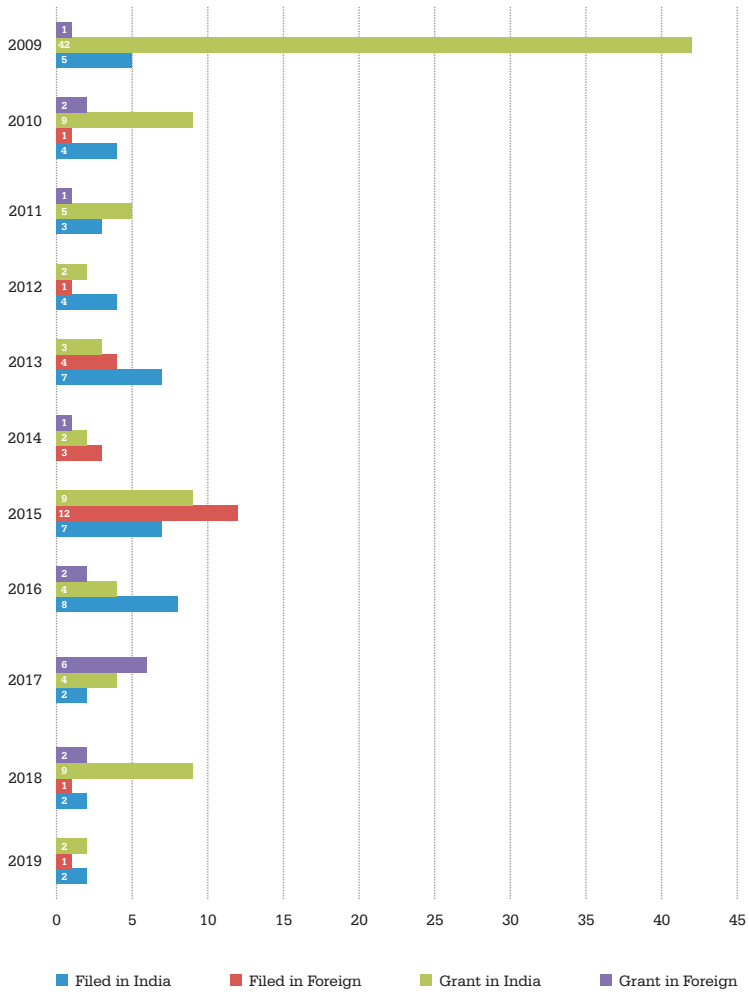
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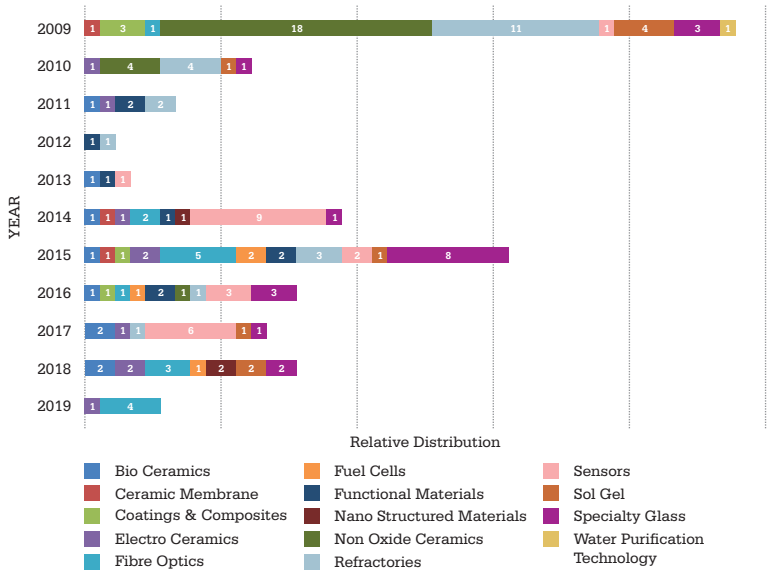

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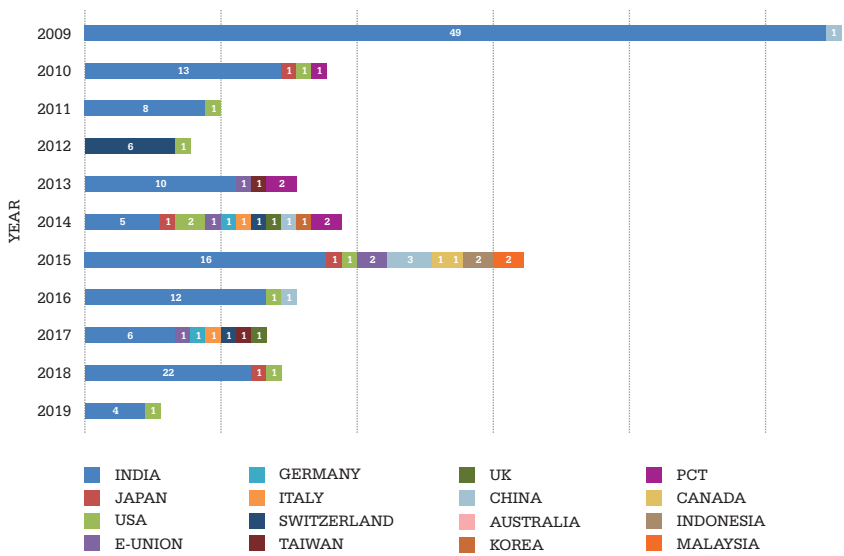

Abstracts of Patents in Force

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A PROCESS FOR THE PREPARATION OF SPECIAL GLASS BEADS USEFUL FOR THE VITRIFICATION OF NUCLEAR WASTE

R SEN, S MANDAL, A ROY CHOWDHURY,
P CHAUDHURI

Application No./Patent No. : 3041DEL2012
First Filing Date : 28/09/2012
Country : India

ABSTRACT

A process for the preparation of borosilicate glass frits and nodules for vitrification of nuclear waste is described. The beads are in the size range of 2-4 mm diameter and fulfil stringent physical and mechanical properties in term of chemical, thermal, mechanical and radiation stability. All these make the material suitable for immobilization of radioactive elements and compound in a glass matrix.

ENERGY EFFICIENT SODA LIME SILICATE GLASS COMPOSITIONS USING BORAX PENTAHYDRATE

B KARMAKAR, A R MOLLA, A TARAFDER, R SEN

Application No./Patent No. : 301394
First Filing Date : 19/02/2013
Country : India, China, Indonesia, Malaysia

ABSTRACT

The invention is directed to borax pentahydrate originated boron oxide (B_2O_3) incorporated energy efficient silicate glass compositions suitable for manufacturing improved container, float and ophthalmic glasses. The invented glasses have the compositions in the ranges: B_2O_3 = 7.2-51.7 wt.%, SiO_2 = 22.7-74.4 wt.%, Na_2O = 13.0-23.5 wt.%, CaO = 3.5-10.5 wt.%, K_2O = 0.03-0.3 wt.%, Al_2O_3 = 0.15-1.3 wt.%, MgO = 0.43-4.0 wt.%, and Fe_2O_3+TiO_2 = 0.05-0.12 wt.%. The evaluated properties of the glasses have revealed that these invented glasses are suitable for manufacturing improved quality container glasses, float glasses and glasses for ophthalmic lens blanks as well. The addition of borax pentahydrate originated B_2O_3 at its optimum level (28.5 – 30.3 wt.% B_2O_3) is found to reduce the glass melting temperature by 150-2000°C. This lowering of glass melting temperature substantially saves energy and reduces the production cost; hence the compositions are energy efficient and cost effectives. It eliminates the use of soda ash and limestone, so it reduces the carbon dioxide (CO_2) emission and thereby global warming; thus these compositions are environmentally friendly as well.

LOW SOFTENING POINT LEAD-FREE TRANSPARENT DIELECTRIC PHOSPHATE GLASS COMPOSITION AND A PROCESS FOR THE PREPARATION THEREOF

B KARMAKAR, A TARAFDER, S P SINGH

Application No./Patent No. : 297733
First Filing Date : 17/01/2011
Country : India

ABSTRACT

The present invention provides a novel lead-free phosphate (P_2O_5)-based low softening point (480-500°C)transparent dielectric (TD) glass compositions for plasma display panel (PDP) having (mol% of) 40-45 ZnO, 42-56 P_2O_5, 0-5 B_2O_3, 0-6 SiO_2, 0-5 Al_2O_3, 0-5 Li_2O, 0-5 Na_2O, 0-5 K_2O, 0-3 CaO, 0-8 BaO and 0-3 SrO and a process for the preparation thereof. The invented glasses are well suited for use with the commercial low cost soda lime silicate (SLS) glass as PDP substrate having low strain point of 510 ± 2°C. In addition, these glasses are capable to avoid yellowing phenomenon when applied on silver electrode coated PDP panel without using any decolorizing constituents in the glass compositions. These glasses have the capability to reduce the cost of PDP production drastically due to use of commercial low cost SLS glass as PDP substrate and their low dielectric constant (6.4-9.3) reduces the power consumption of PDP during operation.

A PROCESS FOR PREPARATION OF IRON-DOPED ALUMINOPHOSPHATE GLASS USING MICROWAVE ENERGY IN AIR ATMOSPHERE FOR HEAT ABSORBING APPLICATION

A K MANDAL, R SEN

Application No./Patent No. : 201611009089
First Filing Date : 16/03/2016
Country : India

ABSTRACT

Heat absorbing property of glass is obtained by incorporating ferrous oxidation state of iron in the glass system. Ferrous oxidation state is having absorption at 1000-1200 nm wavelength in glass. To retain ferrous oxidation state, iron doped glass is usually melted in reducing atmosphere in conventional furnace using reducing agent such as Sn in the composition. The iron doped alumino-phosphate glass with the range of composition in wt.% (P_2O_5 – 70-77, Al_2O_3 – 10- 15, B_2O_3 -1-5, MgO -2-5, ZnO – 2-6) with the addition of metal powder Fe -2-3, Sn 0.25-1, Al 0-1, as dopant, was prepared by melt quenching technique in microwave furnace. Glass composition was optimized in order to get percentage optical transmission as less than 0.10 of 3 mm thick glass at 1050 nm. In microwave furnace, the glasses have been melted in air and % transmission at 1050 nm was compared with the glass melted in nitrogen and in reducing atmosphere. Optical transmission at near IR (~1050 nm) range was found less than 0.1 % and visible % (at 550 nm) was up to 83% in the glasses melted in air atmospheres. Thus, microwave heating offers an easy and useful method to melt IR absorbing glass.

PLASMONIC SILVER-GLASS NANOCOMPOSITE COATING ON SILICA AND SILICON SUBSTRATES AND ITS PREPARATION BY SCREEN PRINTING TECHNIQUE

B KARMAKAR, A TARAFDER

Application No./Patent No. : 201611026485
First Filing Date : 03/08/2016
Country : India

ABSTRACT

The present invention provides plasmonic silver-glass nanocomposite coating on silica and silicon substrates by screen printing for silicon-solar cell application by screen printing technique for use in silicon photovoltaic cell having the glass composition (wt% of) (i) 8 wt% Na_2O, 12 wt% K_2O, 13 wt% BaO, 2 wt% Al_2O_3, 15 wt% B_2O_3, 49.8 wt% SiO_2, 0.05 to 0.2 wt% Ag and 0.1 to 0.3wt% SnO (in-situ) as well as (ii) 8 wt% Na_2O, 12 wt% K_2O, 13 wt% BaO, 2 wt% Al_2O_3, 15 wt% B_2O_3, 50 wt% SiO_2 (ex-situ) and a process for the preparation thereof. The transparency and plasmonic absorption band of the invented plasmonic silver (AgO)-glass nanocomposite coatings can be tailored to enhance the efficiency of Si-photovoltaic. The plasmonic band position and band width vary in the ranges 400-480 and 46-238 nm, respectively. The invented transparent plasmonic silver (AgO)-glass nanocomposite coatings are found to be crack-free as well as thermally and chemically durable.

A PROCESS OF PRODUCING BOROSILICATE GLASS WITH OH CONTENT LESS THAN 70 ppm USING MICROWAVE HEATING

A K MANDAL, R SEN

Application No./Patent No. : 201711000056
First Filing Date : 02/01/2017
Country : India

ABSTRACT

Microwave heating has emerged as an unique technology for processing wide variety of materials. It has already been applied for industrial use. However, melting of glass using microwave heating is relatively new development and is being tested in producing laboratory scale. In conventional heating, OH content in glass is minimised by incorporating gas bubbling during melting. In microwave heating, OH interacts with microwave and volumetric heating drives away the OH, thus minimizing OH content in material. OH content in barium borosilicate glass melted in conventional heating is found to be 146 ppm against 126 ppm in microwave melted glass. Present invention deals with optimisation of melting process to produce barium borosilicate glass with OH content less than 70 ppm using microwave energy as alternate heating route. The composition of glass (in wt.%) is 46.5-SiO_2, 26.5-B_2O_3, 16.5-Na_2O and 10.5-BaO. Melting temperature and time have been optimized 1250°C and 1h, respectively. Bubble free glass with optical transmission ~90% could be produced at 1250°C for 1h melting in microwave furnace. To minimize the OH content in the glass, melting was adopted under oxygen flow inside the microwave cavity. Glass melting in oxygen or dry air atmosphere prevents OH diffusion from atmosphere into melt. OH content could be minimized to 68.8 ppm in glass by using sintered batch in oxygen atmosphere.

A METHOD FOR PREPARATION OF GLASS PRODUCT USING TANNERY SOLID WASTE

A K MANDAL, A HALDER, L RAMRAKHIANI, S GHOSH, R SEN

Application No./Patent No. : 201611041924
First Filing Date : 08/12/2016
Country : India

ABSTRACT

Tannery sludge is hazardous, exists in abundance and creates ecological and environmental issues due to high content of toxic heavy metals. Toxic effects of tannery sludge and effluent on plants, animals and human are mainly reported with chromium toxicity. Hexavalent chromium is a powerful agent that induces mutations and causes cancer in animals and human. The effluents and sludge from tanning operations as well as from biological treatments are discharged into water bodies and onto land creating serious pollution problems. Thus, it is very important to treat the tannery sludge in an environmental friendly and productive manner. It has been reported that complete removal of the toxic elements is difficult and the hazardous materials remain in the treated sludge. To avoid such pollution, several other ways are indicated to trap the waste in different application such as incorporation into clay product or encapsulation in glass matrix. However, there is a lack of evidence of converting the waste into a product for practical application. In this background, present invention deals with the incorporation of tannery solid waste (TSW) into glass matrix and optimization of composition incorporating waste sludge can produce filter glass particularly UV transmitting glass and green filter glass. The invention also reveals preparation of usable glass product utilizing TSW. A zinc phosphate base glass has been melted incorporating different percentage of tannery waste to produce glass. The produced glass shows UV transmittance up to 89% at 360 nm and visible transmission 50-65% at 550 nm for 2 mm thick sample. Further optimization of composition yield UV transmittance 70% at ~370 nm and no significant visible transmission is recorded up to 750 nm. Significant chemical durability has also been observed after 35 days under submerged in distilled water at 75°C for 8h/day. No leaching of hazardous element (Cr,

Cd, Fe, Mn, Cu, Co, Ni, Pb etc.) is detected in distilled water from the glass containing 15-25 wt.% TSW by ICP AES. Thus, TSW can be trapped into the glass, which has high UV transmitting properties. This glass has a potential application in optical devices where UV light needs to be transmitted. The glass can also be used for development of different glass product such as green filter glass, decorated glass, table ware glass etc.

NOVEL SODA LIME SILICATE GLASS COMPOSITION COMPRISING COLEMANITE AND A PROCESS FOR THE PREPARATION THEREOF

A KALYANDURG, K BISWAS, A D SONTAKKE, R SEN

Application No./Patent No. : 1657DEL2013
First Filing Date : 03/06/2013
Country : India, China, Indonesia, Malaysia

ABSTRACT

The invention is directed to the development of soda lime silicate glass compositions for energy efficient processing using colemanite. The invented glasses have the compositions in the ranges: 61.28-69.45 wt.% SiO_2, 4.97-13.14 wt.% B_2O_3, 13.00 wt.% Na_2O, 0.30 wt.% K_2O, 9.28-10.30 wt.% CaO, 0.46-1.24 wt.% MgO, 0.15-0.41 wt.% SrO, 1.30 wt.% Al_2O_3, 0.01 wt.% TiO_2, and trace amount of Fe coming from raw materials. The evaluated thermal, optical, and mechanical properties of the glasses indicate that these invented glasses are suitable for manufacturing superior quality flat glasses specifically for solar panel and container glasses with a significant reduction in batch melting temperature by around 150°C.The incorporation of B_2O_3 at its maximum level of 12.24 wt% for flat glass and 13.24 wt.% for container glass compositions originating from the addition of colemanite with simultaneous substitution for limestone ($CaCO_3$) up to 100% in the investigated glasses resulted in an energy efficient, cost effective and environment friendly glass melting process.

A SYNERGISTIC COMPOSITION USEFUL FOR MAKING SLOW RELEASE NITROGEN FREE PHOSPHOROUS POTASSIUM AND SULFUR OXIDE GLASS AND A PROCESS OF MAKING GLASS THEREFROM

N BISWAS, G K DASMAHAPATRA, K GHOSH

Application No./Patent No. : 5433DELNP2005
First Filing Date : 29/11/2004
Country : India, Bangladesh, USA

ABSTRACT

Phosphorous, potassium and sulfur play important role in the growth and development of plants and soil organic through their involvement in many metabolic pathways. The deficiency of these elements limit plant growth and crop yield. Di-ammonium phosphate, murate of potash and gypsum are the conventional phosphorous, potassium and sulfur fertilizers respectively. Because of their high solubility and increase calcium load on soil through application of gypsum cause damages to soil quality and polluted surface and underground water. The most successful technique is application of phosphorous-potassium-sulfur glass which can be added directly to the soil. Main feature of the present invention is formulation and making of a synergistic composition of high phosphorous, potassium and sulfur containing glass free from alkali like Na_2O, Li_2O and ZnO, which are toxic to the plants. Such glasses are capable of slow release of phosphorous, potassium and sulfur required in the area of agriculture, fungicide, pesticide and weedicides etc. The present invention also emphasize optimization of nutrient content, reduction of calcium load on the soil, minimization of surface and under-ground water pollution and maintenance of acidic environment near the plant roots in the soil.

A PROCESS FOR MAKING RARE EARTH DOPED OPTICAL FIBRE

T BANDOPADHYAY, R SEN, S K BHADRA, K DASGUPTA, M C PAUL

Application No./Patent No. : 223566
First Filing Date : 02/02/2001
Country : India, Australia, Canada, China, UK, Korea, USA, South Africa

ABSTRACT

The present invention provides an improved process for making rare earth doped performs and fibres by combination of MCVD technique and solution doping method, said method comprising developing matched or depressed clad structure inside a silica glass substrate tube followed by deposition of unsintered particulate layer containing GeO_2 and P_2O_5 for formation of the core and solution doping by soaking the porous soot layer into an alcoholic/aqueous solution of RE-salts containing co-dopants like $AlCl_3$/$Al(NO_3)_3$ in definite proportion, controlling the porosity of the soot, dipping period, strength of the solution and the proportion of the codopants to achieve the desired RE ion concentration in the core and minimise the core clad boundary defects and followed by drying, oxidation, dehydration and sintering of the RE containing porous deposit and collapsing at a high temperature to produce the preform and overcladding with silica tubes of suitable dimensions and fibre drawing to produce fibres

A PROCESS OF MAKING RARE EARTH DOPED OPTICAL FIBRE

R Sen, M Chatterjee, M K Naskar, M Pal, M C Paul, S K Bhadra, K Dasgupta, D Ganguli, T Bandopadhyay, A Gedanken

Application No./Patent No. : 01839DELNP2003
First Filing Date : 18/10/2001
Country : India, Australia, Canada, China, France, UK, Korea, USA, Japan, South Africa

ABSTRACT

The present invention discloses a process for making rare earth (RE) doped optical fiber by using RE oxide coated silica nanoparticles as the precursor material, more particularly the method of the present invention involves preparation of stable dispersions (sol) of RE oxide coated silica nanoparticles at ambient temperature and applying a thin coating on the inner surface of silica glass tube following dip coating technique or any other conventional methods, of the said silica sol containing suitable dopants selected from Ge, Al, P, etc., the coated tubes were further processed into optical preforms by following MCVD technique and fiberized in desired configuration, the novelty lies in eliminating the step of the formation of porous soot layer at high temperature by CVD process inside a fused silica glass tube for formation of the core and also in the elemination of the incorporation of the rare earth ions into the porous soot layer following the solution doping technique or other conventional methods, the direct addition of RE oxides in the sol eliminates the formation of microcrystalites and clusters of rare earth ions and prevents change in composition including variation of RE concentration in the core which results in increase in the reproducibility and reliability of the process to a great extent, further the addition of $Ge(OET)_4$ at ambient temperature in the silica sol reduces the quantity of $GeCl_4$ which is required at high temperature to achieve the desired Numerical Aperture.

AN EQUIPMENT FOR THE MANUFACTURE OF THIN MULTIFILAMENT FUSED QUARTZ FIBRE STRANDS AND A PROCESS THEREOF

S K Bhadra, S Chakrabarti, T K Bandyopadhyay, K K Phani, N R Bose, K Dasgupta, R Sen, M C Paul, M Pal, T K Gangopadhyay, P P Giri

Application No./Patent No. : 231611
First Filing Date : 19/03/2001
Country : India

ABSTRACT

An equipment for the manufacture of thin multifilament fused quartz fibre strands characterized by a movable mount (1,2,3) such as herein described, for holding a plurality of fused quartz rods(4) within a heat zone (5) such as herein described, a coating applicator(6) being coaxially fixed surrounding strands of fibre below the said quartz rods (4) and said heat zone(5), a perforated silica disc (4a) is provided at the top of the said heat zone(5) to act as a heat shield-cum-rod(s) guide, a known gathering mechanism(7) fixed below the said coating applicator(6), a strand winding machine(8) is fixed below the said gathering mechanism(7) for rotational and transitional movement.

AN IMPROVED METHOD FOR FABRICATING RARE EARTH DOPED OPTICAL FIBER USING A NEW CODOPANT

R SEN, A DHAR, M C PAUL, H S MAITI

Application No./Patent No. : 0609DEL2009
First Filing Date : 27/03/2009
Country : India, China, USA

ABSTRACT

The present invention provides a method of making rare earth (RE) doped optical fiber using Ba as co-dopant instead of Al or P commonly used for incorporation of the RE in silica glass by MCVD and solution doping technique. The method comprises deposition of particulate layer of GeO_2 doped SiO_2 with or without small P_2O_5 for formation of the core and solution doping by soaking the porous soot layer into an aqueous solution of RE and Ba containing salt. This is followed by dehydration and sintering of the soaked deposit, collapsing at a high temperature to produce the preform and drawing of fibers of appropriate dimension. The use of Ba-oxide enables to eliminate unwanted core–clad interface defect which is common in case of Al doped fibers. The fibers also show good RE uniformity, relatively low optical loss in the 0.6-1.6μm wavelength region and good optical properties suitable for their application in amplifiers, fiber lasers and sensor devices.

PROCESS & FABRICATION OF SILICA BASED INDEX-GUIDED NONLINEAR MICRO STRUCTURAL OPTICAL FIBERS WITH OPTIMIZED SUSPENSION OF INNERMOST AIR HOLES

S K BHADRA, D GHOSH, M PAL, M C PAUL

Application No./Patent No. : 1560DEL2013
First Filing Date : 24/05/2013
Country : India

ABSTRACT

A process of fabricating silica-based index-guided nonlinear microstructured optical fibers (MOF) with optimized suspension of innermost air holes is described where partial and complete sealing techniques are adopted to draw cane of hexagonal air hole structure. In both the cases maintaining proper differential pressure within the capillaries is utmost important to get desired microstructure. Effect of the suspension of the air holes in the innermost ring on the modal effective index is important to achieve higher nonlinearity. This is done by precision control of fiber drawing parameters such as temperature, drawing speed and evacuation pressure. Suspension factor of the innermost air holes surrounding the core, in addition to the airfilling fraction decides the extent of enhancement of nonlinearity which is essential for generating a broad supercontinuum (SC) spectrum with high average power. The present invention helps in producing long length MOF which will be required for developing a SC source for medical applications.

A PROCESS FOR THE FABRICATION OF YTTERBIUM-DOPED CLADDING-PUMPED AIR-CLAD FIBER FOR USE AS HIGH POWER LASER SOURCE

S K BHADRA, D GHOSH, M PAL, M C PAUL, S DAS

Application No./Patent No. : 3814DEL2013
First Filing Date : 30/12/2013
Country : India

ABSTRACT

Confinement of high power pump light into the active core of laser fiber is an important issue that can be overcome by ytterbium-doped cladding-pumped air-clad fiber (ACF) operating in infrared wavelength range. The present invention describes an improvised version of such fiber where fabrication steps and drawing conditions of the ACFs are optimized in silica matrix. The air clad surrounded by low index silica offers a high index contrast and hence high numerical aperture (NA) of the primary cladding which helps to confine the pump light well within the inner silica cladding (primary cladding) and enables efficient coupling of the pump light to the rare earth doped fiber core. ACFs were drawn maintaining feed rate in the range of 8-15 mm/min and high drawing speed of 30-40 m/min during fiber drawing in order to ensure proper air-clad structure with elongated air holes separated by very narrow silica bridges. The core diameter of the ACFs were 9-11 μm and the bridge width was < 1μm. High power laser output was observed from the fabricated Yb-doped ACF at about 1μm using a standard cavity set-up with bulk optical components. For an optimized fiber length of 1.9 m of the ACF, the lasing performance of the fiber was reasonably good with output power of 5.3 W and a slope efficiency of as high as 82%.

A PROCESS OF FABRICATION OF ERBIUM AND YTTERBIUM-CODOPED MULTI-ELEMENTS SILICA GLASS BASED CLADDING PUMPED FIBER

M C PAUL, A DHAR, S DAS, M PAL, S K BHADRA

Application No./Patent No. : 201811021507
First Filing Date : 08/06/2018
Country : India, USA

ABSTRACT

The present invention reveal the fabrication of cladding pump Erbium-Ytterbium co-doped multi-elements silica glass based octagonal shaped optical fiberhaving 10.0 ±2.0 micron core with 0.20 ±0.02 numerical aperture operating around 1.5 μm generating low to moderately high power (5-20 W) with slope efficiency 35-40% suitable for high-power EYDFA (Erbium Ytterbium Doped Fiber Amplifier). The different process parameters associated with Modified Chemical Vapor Deposition (MCVD) process coupled with solution doping technique namely glass composition of SiO_2-GeO_2-P_2O_5-F-Al_2O_3-CeO_2-B_2O_3-Er_2O_3-Yb_2O_3, porous fluorinated phospho-silica core layer deposition temperature (within 1300-1500°C) using backpass deposition method maintaining burner speed of 25-35 mm/min (to achieve uniform porosity to avoid clustering phenomena) followed by pre-sintering (within 1075-1125°C) maintaining burner speed within 280-340 mm/min to control the doping levels of Er_2O_3 (0.40 to 0.60 wt%) and Yb_2O_3 (4.5 to 6.5 wt%) with respect to suitable solution composition to achieve desired Er to Yb ratio (from 1:7 to 1:11) and suitable doping levels of fluorine (0.025 to 0.035 wt%) , GeO_2 (0.25 to 2.5 wt%) CeO_2 (0.1 to 0.2 wt%), Al_2O_3 (0.2 to 0.6 wt%), B_2O_3 (1.0 to 2.5 wt%) content along with P_2O_5 doping levels (20 to 25 wt%), collapsing parameters (to minimize evaporation of phosphorous as P_2O_5 which results central dip formation in refractive index profile) are specifically optimized to make the fabrication process repeatable and reliable. The novelty of fabricated fiber is use of multielement glass of suitable composition (F doping helps to achieve radiation hardness by elimination Si and P-related defect center, Ce-doping helps to prevent the formation of Yb-related defect centers, P doping to enhances Er/Yb solubility in glass, low content of Al doping

helps to minimize the formation of Al-O hole defect centers, Ge doping helps to control numerical aperture (0.20-0.25) while B along with P doping enhance the energy transfer efficiency from Yb to Er through reducing the fluorescence life time of $^4I_{11/2}$ level of Er with increasing the fluorescence life time of $^4I_{13/2}$ level of Er) to suppress 1.0 micron Yb self lasing intrinsically which makes this fiber suitable for high power optical amplifier application having output power 5.0 W (+37 dBm) - 20.0W (+43 dBm) in CATV and free space communication with lasing efficiency in the range of 35-40%. As revealed from on-line measurement of the stability of lasing output power (degradation of output power within 5 to 10% of the initial power) under variation of the cumulative radiation dose of 60°C gamma radiation up to 6.0 Krad at low dose rates (~0.35 to 0.70 rad/s) equivalent to dose rates in free space.

DEVICE FOR ONLINE MONITORING OF TEMPERATURE OF HIGH VOLTAGE POWER CONDUCTORS WITH FIBRE-OPTIC SENSORS

L BAJERKAN, T K GANGOPADHYAY, K DASGUPTA, S BANDYOPADHYAY, P BISWAS, S K BHADRA, H S MAITI

Application No./Patent No. 0891DEL2010
First Filing Date : 13/04/2010
Country : India

ABSTRACT

The present invention relates to a device for monitoring on-line temperature of high voltage cables (up to 400KV) in air stretches,comprising of at least one optical fibre attached to the cable, and said optical fibre comprising of at least one Bragg grating (FBG) with known reflection characteristics into said optical fibre, and measuring devices for detection of light reflected from said Bragg grating(s) in the fibre and for recognizing light reflected from each Bragg grating based on their known reflection characteristics and their unqiue correspondence with temperature of the Bragg grating. The Bragg grating is mounted in a probe, the probe being mounted in and thermally coupled to a housing being mounted on and thermally coupled to the cable, wherein the probe has a cylindrical shape and is mounted in the housing in an opening having essentially the same cross section as the probe but a length exceeding the length of the probe, so as to allow for mutual variations in the temperatures between the probe and housing without subjecting the Bragg grating to strain.

AIR-COOLED DIODE-PUMPED ALL-FIBER CW/QCW THULIUM LASER FOR OPERATING WAVELENGTH OF 1.94μm

A PAL, D PAL, S D CHOWDHURY, R SEN

Application No./Patent No. : 201911001722
First Filing Date : 15/01/2019
Country : India

ABSTRACT

The present invention provides a method of developing air-cooled diode-pumped all-fiber CW/QCW thulium laser for operating wavelength of 1.94 μm to deliver CW power up to 37W with efficient thermal management in air-cooled operation. The pumping with a set of laser diodes can operate the TFL in CW as well as QCW mode. The judicious assembling of optical components for optical engine on suitable aircooled aluminum heat sink is effective in terms of size, cost and maintenance. The counter-propagating configuration is effective in terms of heat dissipation compared to the co-propagation as the laser light propagates in opposite direction of the pump and consequently the separation of the pump light from the laser light is not required. The optimum all-fiber laser architecture provides stable and repeatable operation with slope efficiency of 50% against launched pump power. The SNR of the TFL is > 35 dB with line width of 0.25 nm. The TFL can be modulated in the range of repetition rate from 10 to 1000 Hz with pulse width of 40μs to 2μs. The rugged maintenance free operation of such air-cooled compact TFL with wall-plug efficiency of 17% is suitable for easy integration in laser system for rigorous use in industrial and medical applications.

METHOD AND APPARATUS FOR THE GENERATION OF GAUSSIAN SHAPED TEMPORAL OPTICAL PULSES FOR LASER BASED MATERIAL PROCESSING

N K SHEKHAR, S D CHOWDHURY, M SAHA, M PAL, R SEN

Application No./Patent No. : 201611028763
First Filing Date : 24/08/2016
Country : India

ABSTRACT

The present invention provides a method and apparatus for the generation of optical pulses with Gaussian temporal shape for laser based material processing through large effective core-area optical fibers with high pump overlap factor and low dopant concentration. Disposition of large cores in a relatively thinner cladding allows for less concentration of rare earth ions in the core without compromising the pump absorption rate of these fibers yielding high peak power pulses with large energy, without deformation of Gaussian input pulse profile and having significantly less non-linear component. Maintaining the Gaussian pulse profile, leads to linear growth of peak power of the amplified pulses thus increasing their ablating ability. These fibers due to less concentration of rare earth ions are also devoid of photo-darkening phenomenon and have inherently low numerical aperture that provides a good beam quality meeting the requirements of laser material processing.

A PROCESS FOR FABRICATION OF YTTERBIUM (Yb) DOPED OPTICAL FIBER

R SEN, M SAHA

Application No./Patent No. : 1306DEL2013
First Filing Date : 03/05/2013
Country : India, USA, Canada, China, Czech Republic, Germany, Denmark, Finland, France, UK, Japan,

ABSTRACT

The present invention provides a process for fabrication of rare earth (RE) doped optical fiber through vapour phase doping technique. The method comprises deposition of Al_2O_3 and RE_2O_3 in vapor phase simultaneously in combination with silica during formation of sintered core layer. This is followed by collapsing at a high temperature in stepwise manner to produce the preform and drawing of fibers of appropriate dimension. The process parameters have been optimized in such a way that Al and RE-chelate compounds can be transported to the reaction zone without decomposition and condensation of precursor materials. Thus variations of dopants concentration along the length of the preform have been minimized to $<1\%$ and good repeatability of the process has also been achieved. The resulting fibers also have smooth core-clad boundary devoid of any star-like defect. The process can be reliably adopted for fabrication of large core RE doped optical fibers. The fibers also show relatively low loss, negligible center dip and good optical properties suitable for their application as fiber lasers.

FIBER BRAGG GRATING SENSOR MODULE TO ACQUIRE TEMPERATURE AND VIBRATION COMPENSATED ABSOLUTE MECHANICAL STRAIN FOR ONLINE MONITORING OF CURRENT COLLECTOR OF AN ELECTRIC VEHICLE

N BASUMALLICK, S BANDYOPADHYAY, P BISWAS, B MITRA,
K DASGUPTA

Application No./Patent No. : 201911013439
First Filing Date : 03/04/2019
Country : India

ABSTRACT

A fiber Bragg grating (FBG) sensor module to acquire temperature and vibration compensated absolute mechanical strain for online monitoring of current collector of an electric vehicle is described. This is achieved by designing a sensor housing made of aluminium, which is the same material as that of the carrier, with two sections, one attached to the carrier and the other having no contact with the carrier, with two FBGs in a single fiber attached to it, one in each section, and with a slot for fixing the fiber. The FBG sensor module can easily be riveted to the carrier where the strain developed due to the contact force is maximum, without compromising on the strain transfer from the CC to the fiber. The invention also has provision for extracting the vibration signature of the CC and maximizing the echanical strain experienced by the FBG.

A PROCESS FOR MAKING ANODE SUPPORTED PLANER SOLID OXIDE FUEL CELL

R N BASU, A DASSHARMA, S S KUMAR, H S MAITI

Application No./Patent No. : 267662
First Filing Date : 04/12/2006
Country : India

ABSTRACT

The present invention provides a novel process for the fabrication of anode-supported single cell of solid oxide fuel cell (SOFC) in planar configuration that is based on development of porous anode supported half cell consisting of a thin and gas-tight zirconia, more specifically, 8 mole% yttria stabilized zirconia (YSZ) electrolyte layer over porous nickel oxide-8 mole% yttria stabilized zirconia (NiO-YSZ) anode substrate of dimension up to 5 cm x 5 cm x 1.5 mm for square geometry or up to 5 cm diameter and 1.5 mm thickness for circular geometry followed by development of 40 to 60μm of a porous strontium doped lanthanum manganite (LSM) cathode layer over the YSZ electrolyte layer to form the single cell. Using the cells thus fabricated a current density as high as 1.0A/cm^2 can be achieved at an operating temperature of 800°C under a cell voltage of 0.7 V.

IMPROVED PROCESS FOR THE PREPARATION OF PLANAR ANODE-SUPPORTED SOLID OXIDE FUEL CELL

R N BASU, M MUKHOPADHYAY, J MUKHOPADHYAY, A DASSHARMA

Application No./Patent No. : 302932
First Filing Date : 17/08/2010
Country : India

ABSTRACT

This invention provides a novel process for the fabrication of a planar anode-supported solid oxide fuel cell (SOFC) of dimension up to 10 cm x 10 cm x 1.5 mm that comprises a novel Ni-YSZ functional cermet anode wherein the functionality in the anode is achieved through a uniform coating of discrete Ni particles over YSZ that leads to improved electrocatalytic reaction at the anode-electrolyte interface and hence, improved performance in the resultant cells having such functional anode which is well bonded to a 10 – 15 μm thin and gas-tight YSZ electrolyte layer that, in turn, has successive adherent layers of semi-porous LSM–YSZ cathode (8 - 15 μm) and porous LSM cathode current collector (40 – 70 μm) on top.

THERMALLY CYCLABLE GLASS SEALANT COMPOSITION FOR INTERMEDIATE TEMPERATURE SOLID OXIDE FUEL CELL AND A PROCESS THEREOF

B KARMAKAR, R N BASU,A TARAFDER, N SASMAL, M GARAI

Application No./Patent No. : 2110DEL2015
First Filing Date : 13/07/2015
Country : India

ABSTRACT

The present invention provides a novel alkali and barium-free NiO containing boro-silicate phosphate (P_2O_5) based glass compositions for solid oxide fuel cell (SOFC) having (mol% of) 20-26 CaO, 20-26 SrO, 3-10 B_2O_3, 34-42 SiO_2, 1-5 P_2O_5, 1-5 Al_2O_3, 1-4 TiO_2, 1-5 NiO, 2-4 La_2O_3 and 1-3 CeO_2 and a process for the preparation thereof. The invented glasses are well suited for use with the SOFC stack components having the CTE value of 9.85 to 12.22 x 10-6/K. In addition, these glasses exhibit thermally cyclability when they are being tested in 25°C - 800°C - 25°C temperature regions. It is also found that these thermally cyclable glasses are thermally stable up to 1,000 h. These glasses have the capability to reduce the reaction with the intermediate temperature SOFC components since the glass compositions are alkali and bariumfree.Moreover, the glass compositions are equally useable in solid oxide electrolyzer cell (SOEC).

A SOLID OXIDE FUEL CELL STACK

R N BASU, J MUKHOPADHYAY, S DAS, P K DAS, A DAS SHARMA, T DEY

Application No./Patent No. : 0536DEL2015
First Filing Date : 25/02/2015
Country : India

ABSTRACT

The present invention provides a process for making solid oxide fuel cell (SOFC) stack in planar configuration using planar anode-supported SOFC single cells, glass-based high temperature sealant and ferritic stainless steel based bipolar plates and current collection plates having a novel segmented serpentine with baffle distributors flow field for the reactant gases (both fuel and oxidant) to produce electrical power through electrochemical reaction of the fuel gas with the oxidant when operated at a temperature in the range 700 – 850°C. Such SOFC stack can be used for the construction of SOFC power packs/systems that can be utilized as an efficient and non-conventional energy source for electrical power generation in an environmentally benign manner.

CERAMIC COATED PAPER-BASED SEPARATOR FOR LITHIUMION BATTERIES AND A PROCESS THEREOF

R N BASU, M W RAJA, S MAITI, S GOPUKUMAR

Application No./Patent No. : 201611041207
First Filing Date : 02/12/2016
Country : India

ABSTRACT

A novel paper based ceramic separator has been fabricated using ordinary paper (cellulose matrix) as substrate embedded with ultrafine ceramic fiber. Such special type of ceramic-polymer materials have been successfully engineered to overcome several drawbacks associated with today's polypropylene type commercial separator (commonly known as "Celgard") used in lithium-ion battery Cellulose based paper matrix is one of the most abundant, renewable resources on the earth and possesses outstanding properties such as high dielectric constant, good chemical stability and superior thermal stability. On the other hand, cheap and easily available SiO_2 ceramic has been introduced to reinforce the thermal and structural stability of separator during LIB operation. The paper based ceramic separator has been fabricated using controlled dip coating method. The polymeric suspension with ceramic fiber was prepared and the paper matrix is then slowly dipped and passed onto the suspension. The soaked paper is then dried and hot compressed. The compacted separator is then kept in a vacuum oven for 12 hours to remove moisture from the surface of the creamer. These developed paper based ceramic separator are safe and inexpensive. They are prepared from easily available raw materials; fabrication process is less time consuming and showed outstanding physiochemical and electrochemical properties. The developed paper based ceramic separator may be considered as next generation separator in all type lithium-ion battery applications.

A PROCESS FOR MAKING LANTHANUM CHROMITE DENSE PRODUCTS IN AIR AT LOW TEMPERATURE PARTICULARLY SUITABLE FOR APPLICATION IN SOLID OXIDE FUEL CELLS

A KUMAR, P SUJATHA DEVI, H S MAITI

Application No./Patent No. : 270189
First Filing Date : 30/06/2004
Country : India

ABSTRACT

The present invention provides a process for making calcium substituted lanthanum chromite dense products particularly suitable for application in solid oxide fuel cells that can be sintered to density more than 95% of theoretical density at temperatures as low as 1350°C in air. Thus, the present invention provides a process for the fabrication of dense lanthanum chromite based sintered product that finds application in the fabrication of solid oxide fuel cell power pack. This low sintering temperature help in co-sintering of the monolithic solid oxide fuel cell components and hence would be highly advantageous in the efficient fabrication of SOFC.

A PROCESS FOR THE CONTINUOUS PRODUCTION OF SINTERACTIVE LANTHANUM CHROMITE BASED OXIDES

A KUMAR, P SUJATHA DEVI, A DASSHARMA, J MUKHOPADHYAY, H S MAITI

Application No./Patent No. : 283758
First Filing Date : 30/06/2004
Country : India

ABSTRACT

The present invention provides a spray-pyrolysis process for continuous production of sinteractive lanthanum chromite based ceramic oxides by atomizing a citrate-nitrate-glycine precursor solution that can initiate a controlled exothermic anionic oxidation-reduction reaction leading to a self propagating autoignition (self–ignition) reaction within individual droplets and utilizing the thermal energy of the anionic oxidation-reduction reaction to convert the precursor to their corresponding ceramic oxides and thus lower the external energy need of the overall process. These sinteractive lanthanum chromite based oxide powders find application in the fabrication of sintered interconnect plates for solid oxide fuel cell application

A PROCESS OF MAKING BIMETALLIC PALLADIUM BASED NANOPOROUS ALLOY

S DASGUPTA, K MANDAL, D BHATTACHARJEE

Application No./Patent No. : 0622DEL2015
First Filing Date : 05/03/2015
Country : India

ABSTRACT

Hydrogen is a promising source of energy in fuel cells, combustion motors, chemical reactors and an important starting material for many chemical reactions. Although very high power densities can be generated in fuel cells powered by pure hydrogen, traditionally produced hydrogen gas has disadvantages with regard to the cost for its generation, difficulty in storing and often contains carbon monoxide which is deleterious to the catalyst in fuel cells. So, development very good controlled hydrogen storage and release system can be used in fuel cells as the potential alternative portable power sources. Given the difficulty in storing the volatile hydrogen gas, it is a particular objective to provide a process of preparing hydrogen gas in situ, in other words, instantly upon demand of a selected, hydrogen consuming device or process. Preferably, such a vehicle does not require a heavy and dangerous container for storage of hydrogen gas. Low molecular weight organic molecule like formic acid is capable of in situ hydrogen production upon demand from a hydrogen consuming device via catalytic decomposition reaction. In this work, a new nanoporous PdAg alloy catalyst (particle size 2 to 4 nm) has been developed that generate CO-free hydrogen from formic acid at near ambient temperature with high efficiency. The produced hydrogen can be used in situ, at a desired high rate for feeding a hydrogen consuming device or a hydrogen consuming process directly.

A PROCESS OF MANUFACTURING INORGANIC-ORGANIC HYBRID SOL AND SOL COATED SCRATCH RESISTANT POLYCARBONATE SHEETS AND LENSES AND OTHER RELATED PLASTICS

G DE, D KUNDU, S K MEDDA

Application No./Patent No. : 228274
First Filing Date : 29/05/2003
Country : India

ABSTRACT

In the present invention a process for the manufacture of inorganic-organic hybrid sols suitable for scratch resistant coating deposition up to SO days on polycarbonate sheets and lenses have been disclosed. The sol is prepared from tetraethylorthosilicate (TEOS), 3-glycidoxypropyltrimethoxysilane (GLYMO), 3-methacryloxypropyltri-methoxysilane (MEMO) and p-tolune sulphonic acid (PTSA) modified boemite nanoparticles dispersed in butanol-methanol mixture. Hydrolysis and condensation reactions form inorganic polymeric networks like Si-0-Si and Al-0-Si. Epoxy groups of GLYMO is polymerised in the sol stage in presence of an initiator 1-methyl imidazole. One UV photo initiator (Benzoyl peroxide or 1-hydroxy-cyclohexyl-phenyl-ketone) is mixed with the sol to help the methacrylate polymerization during UV curing of the coating. The concentrated sol (viscosity in the range 18 to 32 cps) is used for coating deposition. Scratch resistant coatings of thickness 5 to 8 μm thick can be deposited on polycarbonate sheets and lenses by dip-coating techniqque. The sol after 90 days of ageing (viscous sol having viscosity in the range of 32 cps).

A PROCESS OF MAKING THERMALLY CURABLE INORGANIC-ORGANIC HYBRID COATING SOL FOR PROVIDING ANTISCRATCH COATING ON PLASTICS

G DE, S K MEDDA

Application No./Patent No. : 196846
First Filing Date : 02/09/2003
Country : India

ABSTRACT

A thermal curable inorganic-organic hybrid coating sols derived from tetraalkoxysilane and epoxyalkylalkoxysilane having longer shelf life, suitable for deposition of anti scratch coatings on plastic (CR-39®, polycarbonate, PMMA and other related plastics) ophthalmic lenses, sheets and other shapes have been developed. The high hardness of the coatings is due to the generation of glass-like dense silica nanoparticles in situ in the sol which remain bonded with the silica-organic polymer network. These anti scratch coatings can also be applicable for previously tinted (with conventional dyes) plastic lenses.

UV CURABLE METHACRYLATE-SILICA BASED NANOCOMPOSITE SOL USEFUL FOR ANTI SCRATCH COATINGS AND A PROCESS THEREOF

G DE, S K MEDDA

Application No./Patent No. : 264741
First Filing Date : 03/07/2007
Country : India

ABSTRACT

An UV curable 'methacrylate-silica' hybrid nanocomposite sols derived from tetraalkoxysilane and methacryloxyalkylalkoxysilanes and acrylate polymerization photoinitiator having longer shelf life, suitable for deposition of anti-scratch coatings on PMMA and other related plastics have been developed. Conveyorised UV curing machine was used to cure the coating materials. The high hardness of the cured coatings is due to the generation of glass-like dense silica nanoparticles in situ in the sol which remain bonded with the organic-silica polymer network after UV-curing.

A PROCESS OF MAKING INORGANIC-ORGANIC HYBRID SOLS FOR THE DEPOSITION OF ANTIREFLECTIVE (AR) COATINGS ON PLASTIC SUBSTRATES

G DE, S DE, S K MEDDA

Application No./Patent No. : 287049
First Filing Date : 15/09/2009
Country : India

ABSTRACT

Optically clear AR coatings on previously hard-coated plastic ophthalmic lenses and sheets have been developed following a two layer (high and low index) quarter wavelength coating design followed by deposition of one hydrophobic layer on top and cured by thermal and UV curing. High index coating sol based on 'SiO_2-TiO_2-PEO' or 'SiO_2-ZrO_2-PEO', and low index sol based on 'SiO_2 PEO' organic-inorganic polymeric networks have been used for the deposition of such AR coatings. About 98% transmissions (reflective loss minimizes to 1.1-1.3%) have been achieved after deposition of such AR coatings. Deposition of a very thin hydrophobic coating derived from mixture of alkyl chlorosilanes solution as a top layer further increased the overall hardness value to 5H plus (ASTM D 3363) and hydrophobic nature without affecting the optical property of AR coating. The reflection minima can be tuned at different wavelengths as per optical designs.

A PROCESS FOR THE PREPARTION OF INORGANIC-ORGANIC HYBRID SOLS FOR HARD COATING DEPOSITION

G DE, S K MEDDA

Application No./Patent No. : 296621
First Filing Date : 12/08/2011
Country : India

ABSTRACT

Inorganic-organic hybrid sols suitable for deposition of thermal/UV-thermal curable hard and protective coatings on PP, PET and related plastics (with or without primer coating for better adhesion) have been disclosed. Coatings of 1-5 μm thickness show high optical transparency and excellent abrasion, surface hardness (5-6H), and adhesion properties. Coating materials have also thermal, water and chemical resistant characteristics under atmospheric conditions.

A PROCESS OF MAKING SOLS USEFUL FOR REFRACTIVE INDEX CONTROLLED COATINGS ON PLASTICS FOR SCRATCH HEALING PURPOSE

S K MEDDA, G DE

Application No./Patent No. : 3601DEL2014
First Filing Date : 09/12/2014
Country : India

ABSTRACT

Refractive index controlled (1.48-1.65) thermal/UV-thermal curable sols useable to deposit scratch-healing optical quality coatings on plastics (CR-39®, PC and related plastics) ophthalmic lenses and sheets were developed. Coating sols were prepared by varying low-(SiO_2) and high-index (TiO_2) components, using TTIP as high index component without addition of any chelating agent. Coatings of 1-5 μm thickness showed high transparency, excellent abrasion resistivity, hardness (4-6H: depending on plastic used), and adhesion (ASTM Class 5B) properties as well as thermal and chemical resistance characteristics. Matching refractive index (RI) value of the coatings and the plastic substrate is helpful to heal the scratches on the surfaces; these index matching hard coatings (variable RI) would be useful for plastics of different RI values.

ANTIREFLECTIVE (AR) CUM HYDROPHOBIC COATINGS COMPOSITION FOR ORDERED MESOPOROUS SILICA ON TEXTURED SOLAR COVER GLASSES TO INCREASE PHOTOCURRENT WITH EASY MAINTENANCE

G DE, S MANNA, S K MEDDA

Application No./Patent No. : 201811023896
First Filing Date : 27/06/2018
Country : India

ABSTRACT

The present invention discloses sol formulations and method of applying antireflective (AR) cum hydrophobic coatings with good abrasion resistant quality on millimeter scale textured solar cover glasses. First, the AR coatings have been deposited using a surfactant templated silica solto obtain 3D cubic ordered mesoporous silica layer. The AR layer has been further functionalized by a very thin hydrophobic layer (water contact angle 120-135°) without affecting the antireflection effect. The final thickneses of the AR and hydrophobic layer have been varied in the ranges 150-600 nm and 20-45 nm, respectively. The above bi-layer coated solar glass showed increase of average solar transmission 4% by reducing the reflection in the wavelength range 350-2000 nm compared to the uncoated solar glass, and self-cleaning property due to its hydrophobic surface. Accordingly, the fabricated solar modules (tested with 36 cell with output values ~18 V/~2.7 A/~48.6 W) using the above coatings showed enhancement of photo-current >3 to 4.5% (under simulated solar light of 1 Sun) and output current/power ~5-7% (under ambient solar light) and easy maintenance due to its self-cleaing hydrophobic surface.

SPONGY TIN DOPED INDIUM OXIDE (ITO) AND PROCESS FOR THE PREPARATION THEREOF

P K BISWAS, S JANA, N DAS

Application No./Patent No. : 299031
First Filing Date : 15/05/2012
Country : India

ABSTRACT

Preparation of spongy porous indium tin oxide (ITO) foam by sol-gel process is presented. The preparation process includes doping of Sn in In_2O_3 (In : Sn = 95 : 05) in precursor sol (6 wt% equivalent metal oxides content) starting from aqueous solution of metal salts and an organic binder. This newly made spongy porous ITO foam possesses relatively high electrical conductivity may have potential applications in various fields including DSSC and QD based organic-inorganic hybrid solar cell which presently belongs to the frontier research area as an energy related system.

A MICROWAVE ASSISTED SOL GEL DIP PROCESS OF COATING INDIUM TIN OXIDE FILMS ON SODA LIME SILICA GLASS SUBSTRATES

P K BISWAS, S JANA, S S GHOSH, A MALLICK

Application No./Patent No. : 302149
First Filing Date : 19/02/2013
Country : India

ABSTRACT

A process of making indium tin oxide (ITO) precursor (concentration, 6-10 wt% equivalent oxide with In : Sn = 96:04 to 84:16) and dip coated microwave assisted ITO films on soda lime silica glass therefrom which comprises the preparation of paste like material based ITO precursor of hydroxo bridged In(III) and Sn(IV) and acetylacetonato complexed species of In(III), deposition of precursor layer by the dipping process (4-10 cm/min withdrawal speed) onto cleaned glass substrate (maximum dimensions, 300mm x 300mm, 2-5 mm thickness), initial baking thermally at 150-200°C in different atmospheres to form gel film to be used as microwave susceptor, intermediate baking with/without microwave showering to create more anchoring sites giving rise to dangling state, next baking up to 490–500°C in vacuum (10^{-4}-10^{-5} mbar) to provide condensed film of pencil hardness 6H-7H close to that of glass, 9H., final baking in presence of reducing gas [Ar (95%)-H_2 (5%)] at 490–500°C followed by the vacuum treatment from 490–500°C to 80-100°C to provide ITO films of 0.70-1.5 μm physical thickness by single operation with more defect centres having low sheet resistance, 35-100 ohm/sq and 82-84% visible transmissivity.

A PROCESS FOR THE MANUFACTURE OF DENSE HIGH ALUMINA REFRACTORY AGGREGATE FROM SILLIMANITE SAND BASED MINERALS

H S TRIPATHI, A GHOSH, B MUKHERJEE, S K DAS

Application No./Patent No. : 235106
First Filing Date : 05/03/2003
Country : India

ABSTRACT

The present invention relates to a process for the manufacture of dense high alumina refractory aggregate from sillimanite sand based minerals. This has been made possible by providing a process wherein the starting material is a novel composition consisting of sillimanite sand minerals, ZrO_2 and TiO_2. The process involves proper milling of the novel mixture and single firing at a temperature between 1500° to 1600°C. The novel composition helps intensify the densification through liquid phase sintering and controls the glassy phase and improves the high temperature properties. The aggregates produced have high alumina content, in the range of 55 to 62% Al_2O_3, and have above 98% densification, average grain size of 5 to 10 μm, hot modulus of rupture at 1250°C is 1700 to 2100 kg/cm^2. Dense high alumina refractory aggregates are in great demand in refractory industries.

A NOVEL PROCESS FOR THE PREPARATION OF HYDRATION RESISTANT LIME

P S MUKHERJEE,R K GALGALI, J L GUMASTE, B K MISHRA, H S MAITI, B MUKHERJEE, A GHOSH, H S TRIPATHI

Application No./Patent No. : 269921
First Filing Date : 02/05/2008
Country : India

ABSTRACT

Calcium Oxide is an excellent refractory material and as per Ellingham diagram is the most stable of all the oxide materials used as refractory. Plenty of pure raw materials containing calcium oxide are available in nature abundantly. The material at present is not or rather cannot be used as a refractory material owing to its extreme hydration tendency in atmosphere. Once the hydration resistant calcium oxide is available the same can be used for developing various refractory products for particular areas of applications in metallurgical industry. The process of making calcium oxide hydration resistant through sintering or fusion either takes a lot of time or is not techno-economically viable. Hydration resistant calcium oxide with low porosity can be developed in a moving bed plasma reactor in a span of 1-3 minutes. Proper control of particle size distribution, controlling the plasma parameters and suitable additives can achieve the same.

A PROCESS FOR THE PRODUCTION OF VALUE ADDED REFRACTORY AGGREGATES FROM LOW GRADE BAUXITE AND VALUE ADDED REFRACTORY AGGREGATES PRODUCED THEREBY

H S TRIPATHI, B MUKHERJEE, A GHOSH, M K HALDAR, H S MAITI

Application No./Patent No. : 281457
First Filing Date : 26/03/2008
Country : India

ABSTRACT

The demand for high alumina aggregates for refractory application is increasing due to its excellent high temperature properties. The major application areas of these refractory aggregates are blast furnaces bosh and stoves, bottom and side wall of steel ladles, reheating furnaces, cement rotary kilns etc. Bauxite, which is the main aluminous raw material source for developing these aggregates is associated with harmful impurities and degrades refractory properties. Therefore, these varieties of bauxite without full beneficiation cannot be used, which otherwise is hazardous and expensive process. A new process for the production of these aggregates is developed where bauxite at first is partially beneficiated with 5 to 15% conc. HCl at room temperature to remove one of the detrimental impurity namely lime. In the next step, rice husk ash, which is a waste and abundantly available material is added to this bauxite so that the final composition ranges between 70 to 80% Al_2O_3. The rest of the impurities of bauxite - Fe_2O_3 and TiO_2 - enter into the lattice structure of mullite as solid solution. Al^{3+} present in the octahedral site of mullite crystal is substituted by Ti^{4+} causing aluminium ion vacancies, which enhance the mass transport and sintering rate. The firing schedule is particularly controlled between 1050° to 1250°C, so that mullite formation is completed and the low melting phase from Fe_2O_3 and TiO_2, cannot develop. The ultimate high alumina mullite aggregates thus developed is much superior compared to directly calcined bauxite in terms of physical, microstructural and thermo-mechanical properties. The final product is characterized by 96% densification, compact and homogeneous microstructure with an average grain size of 3 μm and refractoriness under load value of 1600°C.

AN IMPROVED PROCESS FOR PRODUCTION OF DENSE HIGH ALUMINA REFRACTORY AGGREGATES FROM SILLIMANITE SAND

H S TRIPATHI, U ROY, A GHOSH

Application No./Patent No. : 201611027427
First Filing Date : 11/08/2016
Country : India

ABSTRACT

The present invention describes a process for production of high alumina refractory aggregate from sillimanite beach sand. The process involves the mixing of sillimanite, bauxite and synthetic alumina and milling of the mixture. Then it was fired at a temperature range 1500 - 1650°C. The novel composition helps densification without detoriating high temperature properties. As in this process no synthetic additive is used so it is a cost effective process and very much important for the manufacture of high alumina refractory aggregate. Impurities present in bauxite (TiO_2, Fe_2O_3) act as additive in the high alumina composition. The dense aggregate produced in this process have the high alumina content, in the range of 60 to 70% Al_2O_3, and have almost zero porosity and RUL value is 1600 to 1640°C.

A PROCESS FOR THE PRODUCTION OF HIGH ALUMINA CONTAINING SELF FLOW CASTABLE & CAST PRODUCT THEREOF

S K DAS, P K MONDAL, S MUKHERJEE

Application No./Patent No. : 230546
First Filing Date : 15/02/2002
Country : India

ABSTRACT

In the present invention, a process has been developed for the production of high Al_2O_3 self flow castable with superior hot strength properties. In this process, an optimum particle size distribution of product mix has been developed so that the available void volume in a bed is fully occupied by the finer fractions and resulted a dense body. The product produced by the present process has shown Hot MOR value varies from 76-93 Kg/cm^2 at 1400°C (2 hrs) compared to only 25 – 30 Kg/cm^2 obtained by existing known process. The castable product produced by the present invention can be used in Iron & Steel, cement & other high emperature processing industries where high hot strength properties are the prime requirement

PROCESS FOR THE PRODUCTION OF RICE HUSK ASH NODULE USEFUL AS HEAT INSULATING MATERIAL

S K DAS, P K MONDAL

Application No./Patent No. : 244579
First Filing Date : 30/01/2002
Country : India

ABSTRACT

In the present invention, a process has been developed to manufacture rice husk ash nodule as a heat insulating material. In the present process, some specific surface active agents & binders have been used to modify the behaviour of a green nodule during nodulizing & subsequent improvement in plasticity, workability, wetting & green strength. A particular schedule of air & oven drying has been followed to get the final product. The product obtained from the present invention possess lower bulk density (0.72-0.75 gm/cc), higher apparent porosity (58-60%) & a workable crushing strength (15-25 Kg/cm^2) which are the prime requirement of using as a heat insulating material. The developed rice husk ash nodule roduct can be directly used in pre-fired state over molten metal in Iron & Steel Industries for insulating purpose.

A PROCESS FOR THE PRODUCTION OF PLASMA FUSED MAGNESIA RICH MAGNESIUM ALUMINATE SPINEL USEFUL AS REFRACTORY AGGREGATES

M K HALDAR, S K SINGH, A GHOSH

Application No./Patent No. : 3952DEL2015
First Filing Date : 04/12/2015
Country : India

ABSTRACT

In recent time, magnesium aluminate spinel has become a popular refractory material owing to its excellent high temperature refractory properties and considered as a clean and green refractory. Magnesia rich magnesium aluminate spinel is extensively used as a shaped refractory for application in cement rotary kilns, steel ladles and in various secondary refining vessels of steel making processes. The conventional sintering process of refractory for development of spinel phase and its densification requires anything between 10 – 12 hours in a normal furnace involving a long range heating schedule. However, the present invention relates to a process by which magnesia rich magnesium aluminate spinel can be formed and densified through thermal plasma processing utilizing Indian natural magnesite and alumina.The major advantages of thermal plasma fusion over others' are that it promotes rapid densification and quick formation of spinel phase accompanied by high through put in a very short period of time and generates a clean reaction atmosphere for production of high pure materials. This can be achieved by proper control of batch preparation and controlling the corresponding plasma parameters

A PROCESS FOR THE PREPARATION OF CERAMIC COMPOSITIONS WITH ENHANCED MULLITE CONTENT

K DANA, T K MUKHOPADHYAY, S GANGULY, M SARKAR, S GHATAK

Application No./Patent No. : 3498DEL2015
First Filing Date : 28/10/2015
Country : India

ABSTRACT

Mullite is an important phase in several ceramic systems such as in triaxial composition, but the formation of mullite during processing is limited to a certain extent due to thermodynamic reasons. In the present invention mullite formation during firing is catalyzed by a novel method that not only leads to in-situ formation in the body to a larger extent but also requires a lower temperature for its formation.

AN IMPROVED PROCESS FOR THE PREPARATION OF ORGANOPHILIC NANOCLAY

K DANA, T K MUKHOPADHYAY, M SARKAR, S GANGULY, S GHATAK

Application No./Patent No. : 2384DEL2014
First Filing Date : 22/08/2014
Country : India

ABSTRACT

The performance of organophillic nanoclays is limited by its high temperature degradation during polymer composite processing. The present invention provides a method for enhancing the thermal stability of organophillic nanoclays by incorporating suitable physical processes during its manufacture.

SYNTHETIC ASH BASED LOW TEMPERATURE MATURED BONE CHINA TABLEWARE AND ITS PROCESS THEREOF

P AGRAWAL, S N MISRA, SURESH KUMAR J S

Application No./Patent No. : 201611029462
First Filing Date : 30/08/2016
Country : India

ABSTRACT

A method of manufacturing low temperature matured bone china tableware body bearing all the typical characteristics viz. translucency, ring sound and whiteness at a bisquitting temperature which is nearly 100°C lower than conventional bone china bisquitting temperature. Herein, the bone ash is replaced by a synthetically produced compound made up of DCP of animal origin and other material sources of calcium, magnesium, silica and zinc through a process consisting of mixing, de-ironing, calcination, grinding and filtration etc. steps. The produced synthetic compound which is non-plastic, when added with the specially formulated plastic component consisting of quartz, feldspar, china clay and bentonite in certain ratio, a bone china body suitable for slip casting and plastic shaping is obtained. This body can be biscuit fired at 1130°C. The prepared biscuit body can be glazed without any difficulty with conventional bone china glaze and subsequent glost firing along with regular bone china articles fired in glost kiln. The so prepared glost body can be further decorated with conventional decals, liquid gold and ceramic inks used for bone china application and subsequent deco firing along with regular bone china articles fired in decoration kiln.

LDH BASED DRUG DELIVERY SYSTEM (DDS) FORMULATION AND A PROCESS FOR THE PREPARATION THEREOF

J CHAKRABORTY, M CHAKRABORTY, K L DAS, D BASU

Application No./Patent No. : 292752
First Filing Date : 17/02/2011
Country : India

ABSTRACT

This invention concerns a process for the production of a precise nanoceramic based drug delivery system (DDS) formulation free of carbonate anion contamination, particularly for administering anticancerous drug. The anion exchange capacity of magnesium aluminium LDH varies in between 200-400 cmol/kg that reduces due to carbonate anion contamination from atmosphere. Further, in the presence of carbonate anions, the layers of the hydroxide take a rhombohedral stacking arrangement that modifies the molecular dynamics of the layers and lowers the symmetry of the same due to hydrogen bonding with intercalated water molecules and OH groups in the layers. For the purpose, a precise nanoceramic based drug delivery system (DDS) formulation, free of carbonate anion contamination, particularly for administering anticancerous (methotrexate here) drug has been developed.

AN INORGANIC BASE ANTACID COMPOUND WITH IMPROVED AND NOVEL PROPERTIES

J CHAKRABORTY, S RAY, S SAHA, BISWANATH SA

Application No./Patent No. : 201711020405
First Filing Date : 12/06/2017
Country : India

ABSTRACT

Inorganic based antacids are over the counter (OTC) products and most of the OTC products available commercially are either bicarbonate OR hydroxide based salts. Unfortunately, both of these market available formulations are far from being satisfactory, exhibiting acid rebound effect and severe alkalosis and are slow in action and hence, fail to provide instant relief. Insertion of calcium as a divalent metal ion at the site of magnesium by partial replacement of the same in the octahedral hole in 3:1 molar ratio leads to enhancement of positive charge density and formation of strongly alkaline hydroxides when reacted with sodium hydroxide, for synthesis of the antacid molecule by coprecipitation process. Down the group (group IIA) of alkaline earth metals, the heavier elements exhibit more vigorous reaction compared to the lighter elements w.r.t formation of alkali hydroxides. Hence, presence of both the alkaline earth metals, magnesium and calcium ions (with higher alkalinity) at the octahedral site of the structure, renders high alkalinity in the composition which is balanced by the presence of the amphoteric aluminium ion at the tetrahedral hole that aids to attain a substantially long buffering action (due to the slow dissolution of both calcium and aluminium salts in gastric acid in presence of replaceable carbonate and hydroxyl ions in the structure) alongwith the high value of acid neutralizing capacity (ANC), to inhibit any possibility of 'rebound acidity'. The end product of neutralization of the present calcium aluminium based antacid molecule with the gastric acid will be aluminium and calcium chloride which are the water soluble astringent salts and might cause unwarranted side effect, like constipation. Taking this into account and aiming a rapid onset of action, magnesium ion has been partially incorporated at the site of the calcium ion in the chemical structure of the active moiety for rendering a laxative action.

A SYNERGISTIC COMPOSITION USEFUL FOR MAKING POROUS BIOACTIVE SCAFFOLD, BONE FILLER MATERIAL AND BIOACTIVE COATING ON IMPLANTS

S DATTA, D BASU

Application No./Patent No. : 276209
First Filing Date : 27/03/2009
Country : India

ABSTRACT

The present invention provides a synergistic composition for making porous bioactive scaffold, bone filler material and non-metallic bioactive coating on metallic implants and a process of coating thereof. A series of bioactive glass composition suitable for application as coating on surgical grade stainless steel, Co-Cr alloy, Titanium and its alloys and the process of application of the coating has been disclosed. The bioactive glass material can also be processed to yield a porous bioactive scaffold and bone filler materials. The bioactive glassy coating material composition comprised of a mixture, based on its oxide content, of silicon di-oxide, Calcium oxide, phosphorous pentoxide, sodium oxide, magnesium oxide, potassium oxide, zinc oxide, boron tri-oxide, and titanium oxide. In accordance with this invention the coating materials are further processed with a mixture of different calcium phosphates including hydroxyl apatites to improve its properties. The coating is bioactive, defect free, highly adherent and suitable for coating surfaces of different load bearing implants for cement less fixation with surrounding hard tissues.

A PROCESS OF MAKING POROUS BIOACTIVE SCAFFOLDS NANO SIZED CALCIUM HYDROXY APATITE POWDER

S DATTA, D BASU, S K GHOSH

Application No./Patent No. : 268374
First Filing Date : 27/03/2009
Country : India

ABSTRACT

The process of making nano-sized calcium hydroxy apatite powder and its composite with P-Ca_3 $(PO_4)_2$ (3-TCP) and other calcium phosphates through modified solution combustion synthesis using pure or mixed fuels has been disclosed. The phase pure nano-sized calcium hydroxy apatite and the composites comprised of a mixture of calcium hydroxy apatite, ß-tri-calcium phosphate and other phosphates. In accordance with this invention the resultant product obtained by modified solution combustion synthesis is fluffy foam like mass composed of isometric spherical particles of 20-150 nm size. The nano-sized calcium hydroxy apatite powder and its composite material can also be processed to yield a porous bioactive scaffold and bone filler materials.

A PROCESS FOR THE PRODUCTION OF IMPROVED POROUS OCULAR IMPLANTS AND IMPROVED POROUS OCULAR IMPLANTS PRODUCED THEREBY

D BASU, M K SINHA

Application No./Patent No. : 197588
First Filing Date : 19/09/2001
Country : India

ABSTRACT

This invention concerns a process for production of an ocular implant capable of rapid and effective fibrovascular integration of vascular and/or connective tissues following implantation into the orbital cavity of anopthalmic human patients. For the purpose hydroxy apatite powder (HAp) was mixed with naphthalene powder in a ratio in the range of 1:1 to 1:3 w/w and the dry mix was subsequently homogenized by repeated sieving through a sieve of 35 μm mesh size (425 urn). The homogenous powder mixture was compacted to a cylinder shape by isostatic pressing at a pressure in the range of 140 to 160 MPa, which was turned thereafter to green ocular implants. The items were dried at a temperature in the range of 50 to 80° C for a period in the range of 150 to 200 hours and fired at a temperature in the range of 1200 to 1300°C for a soaking period of in the range of 2 to 4 hours to obtain an improved ocular implant. Test samples were developed out of the same material in an identical way and were characterized to understand that the ocular implants with a porosity level of 60-75%, pore size of 100-300μm and adequate mechanical properties are ideally suitable for fibrovascularisation after implantation. Further, the specific gravity of the implants was found to be in the range of 0.55 to 0.7 while the net weight was always below 2 gms which is ideally suitable to impart the desired mobility of the artificial eye-balls like the normal ones.

BIOCERAMIC MATERIALS AS BONE GRAFT SUBSTITUTE AND PROCESS FOR THE PREPARATION THEREOF

B KUNDU, D BANERJEE, S K GHOSH, S ROY, G BANERJEE, S NATH, M K SINHA, D BASU

Application No./Patent No. : 288878
First Filing Date : 31/03/2008
Country : India

ABSTRACT

Due to the need for safer bone graft materials, bone graft substitutes, bioceramics have recently received considerable attention. Synthetic hydroxyapatite (HAp) and beta tricalcium phosphate (β-TCP) are promising bone-substitute materials in the orthopaedic and dental fields, as their chemical composition is similar to that of bone. In the present invention an ideal composition called biphasic calcium phosphate (BCP) ceramics have been developed consisting of HAp and β-TCP in the weight % ratio of approximately 70:30 which is expected to perform better in vivo in the long term application. Earlier reports were based on powder prepared by a mere mixture of commercially produced HAp and β-TCP powders. In the present invention in situ formation of BCP in which HAp and TCP are mixed at the atomic level has been described. Accordingly pre-calculated stoichiometric quantity of ortho-phosphoric acid solution was added drop-wise (5-10 ml/min.) in 1 M solution of calcium hydroxide at room temperature under continuous stirring. The gelatinous mass thus produced was subsequently boiled, aged for approximately 50 h, washed, dried at 800°C for 50 h, crushed, sieved through 52 BSS (< 296 micron) and calcined at 8000°C for about 2 h to give biphasic calcium phosphate crystals in a weight ratio about 70:30 which, can get excellent results when used as bioceramic or bone repair/restoration products. X-ray diffraction study was used extensively to evaluate the same powder for its consistency of same results in terms of quantitative percent of phases, percent crystallinity and average crystallite size.

AN INJECTABLE BIODEGRADABLE BONE CEMENT COMPOSITE AND A PROCESS FOR THE PREPARATION THEREOF

S MISTRY, S DATTA, S DATTA, B KUNDU

Application No./Patent No. : 1979DEL2015
First Filing Date : 01/07/2015
Country : India

ABSTRACT

The present invention relates to an artificial bone cement material which comprises at least two ceramics, one or more drugs, and at least one biodegradable polymer in the powder component. The powder component and an aqueous liquid component are mixed together to form a cement slurry that renders the paste effective for injection with a manually operated syringe and capable of hardening in vivo. The double barrier (polymer and calcium sulphate dihydrate) against the drug release from ceramic granules makes it suitable for use in the repair of infected or aseptic bone defects in a wide variety of orthopaedic and oral/maxillofacial abnormalities.

A METHOD OF MANUFACTURING DENSE AND WARPAGE FREE LEAD ZIRCONATE TITANATE WAFERS

A SEAL, R MAZUMDER, N DAS, A SEN

Application No./Patent No. : 0672DEL2006
First Filing Date : 10/03/2006
Country : India

ABSTRACT

This invention relates to a method of manufacturing dense and warpage free lead zirconate titanate wafers through tape casting. Such wafers show acceptable piezoelectric properties and can be used for ultrasonic non-destructive evaluation of structures. The invented method provides easy release of PZT (along with a small amount of excess PbO) green tapes. The invented method also gets around the problem of sticking of the tapes with the setter plate during sintering and lead loss at high temperature.

A PROCESS OF MAKING LEAD ZIRCONATE TITANATE (PZT) CERAMICS SHOWING RELAXOR BEHAVIOUR AND RELAXOR PZT BASED MOISTURE SENSOR MADE THEREFROM

S DAS, A SEAL, K SENGUPTA, A SEN

Application No./Patent No. : 301180
First Filing Date : 13/11/2007
Country : India

ABSTRACT

This invention relates to a process of making dense lead zirconate titanate ceramics showing low frequency dispersion behaviour with consequent variation of capacitance with the ambient humidity. The PZT [Pb(Zr0.52Ti0.48)03] powder was synthesized by a mixed route of citrate nitrate gel method followed by solid state mixing and calcination. PZT pellets (with 1-5 wt% excess Pb0 as a sintering aid) were made by pressing the powder with a pressure of 64 MPa. The PZT pellets (kept on a dense 8YSZ plate) were inserted inside a furnace preheated to a temperature in the range of 900-950°C. The pellets were kept inside the furnace maintained at that temperature for 30-120 min and allowed to cool inside by switching off the furnace. The two surfaces of the fast fired PZT pellets were ground to remove the surface layers and to keep the thickness of the pellet in the range of 0.4-0.5 mm. The pellets after polishing were ultrasonically cleaned and electroded on both sides by silver paste followed by curing at a temperature in the range of 600 – 650°C for a time in the range of 30-45 min. The humidity sensing behavior of the electroded PZT pellets were studied by placing them in a closed desiccator maintained under different relative humidities by using saturated salt solutions. As the sensor material is primarily nonporous the response / recovery of the sensors is very fast. In comparison to porous humidity sensors, these nearly nonporous sensors are supposed to be more rigid and should show a low hysteresis and drift.

A METHOD OF MANUFACTURING DENSE AND WARPAGE FREE LEAD ZIRCONATE TITANATE WAFERS

R MAZUMDER, A SEN

Application No./Patent No. : 292979
First Filing Date : 26/02/2007
Country : India

ABSTRACT

The invention relates to a method of making nanosized PZT[$Pb(Zr_{0.52}Ti_{0.48})O_3$] powder by a modified citrate-nitrate gel method at a temperature of 500°C. The synthesized powder can be sintered at a temperature in the range of 750-800°C by adding a small amount of sintering aid like $LiBiO_2$. This contrasts to normally required sintering temperature of 1200-1300°C and hence the process is cost-effective. Also there is no need to atmosphere control during sintering to contain lead volatilization, as the sintering temperature is low. Above all, the piezoelectric properties of the sintered samples are equivalent or superior to those made by conventional sintering at a high temperature. For example, the sintered PZT pellets made by the invented process followed by poling at 100-130°C under an electric field of 1-3kV/mm showed E_{33} in the range of 970-1225, d_{33} in the range of 230-465 pC/N, g_{33} in the range of 27-43x10^{-3} V-m/N, kp in the range of 0.41-0.63, Qm in the range of 23-54, whereas for PZT sintered above 1200°C, the literature reported values are E_{33}=730, d_{33}=223 pC/N, g_{33}=34.5 V-m/N, kp= 0.51, Qm= 500 (Qm for the soft PZT formulation is in the range of 60-80). Hence, the PZT ceramics made by the invented method will be cost-effective and can be used for low-power ultrasonics, sensors, pickups, acoustic devices and actuators.

AN IMPROVED METHOD FOR PREPARATION OF KNN TAPES

S GOSWAMI, A SEN

Application No./Patent No. : 0771DEL2010
First Filing Date : 31/03/2010
Country : India

ABSTRACT

The invention relates to a method of tape casting potassium sodium niobate (KNN) for making piezoelectric wafers and multilayer actuators. The invented method provides the selection and optimization of proper dispersant and processing variables necessary for successful tape casting. The method provides a scope for making lead-free environment-friendly piezo wafers and multilayers. The piezo tapes fabricated by this method after sintering showed satisfactory dielectric and piezoelectric properties.

AN IMPROVED SENSOR COMPOSITION FOR ACETONE DETECTION IN BREATH FOR DIABETIC DIAGNOSTICS

A SEN, S RANA

Application No./Patent No. : 1313DEL2012
First Filing Date : 30/04/2012
Country : India, China, USA, Switzerland, Germany, UK, Italy, Japan, Korea, Taiwan

ABSTRACT

The present invention provides an improved sensor composition for acetone detection in breath for diabetic diagnostics and the process of preparation thereof. The sensor composition is based on semiconducting nanostructured γ-Fe_2O_3. The sensor is selective to low concentration of acetone, the breath biomarker of diabetes, in presence of a high amount of moisture normally present in breath. Such semiconductor sensors for diabetes monitoring are inexpensive, rugged, patient-friendly and on the top, non-invasive.

SENSOR COMPOSITIONS FOR DETECTION OF LINALOOL, GERANIOL, METHYL SALICYLATE AND TRANS-2-HEXENAL WITH AN INTENTION TO CLASSIFY BLACK TEA AROMA

A SEN, S MANDAL, M NARJINARY, S GHOSH

Application No./Patent No. : 0537DEL2015
First Filing Date : 25/02/2015
Country : India

ABSTRACT

The present invention provides metal oxide semiconductor sensor compositions for detection of four major volatile compounds linalool, geraniol, methyl salicylate and trans-2-hexenal responsible for aroma in black tea with partially overlapping selectivity with an intention to classify black tea aroma using the sensors in an array form (e-nose). The sensor compositions are selective towards low concentrations of abovementioned VOCs which are markers for black tea aroma. Such semiconductor sensors for tea aroma classification are inexpensive, rugged, operator-friendly, and on the top, non-invasive. As the studied/available e-nose for tea gradation is based on sensors not specifically made for detection of tea aroma VOCs, the sensors made from the invented compositions are expected to provide high performance e-nose.

A PROCESS FOR PREPARATION OF THIN FILM MOISTURE SENSOR FOR DETERMINATION OF TRACE MOISTURE IN GASEOUS PHASE

D SAHA, S DAS, P SUJATHA DEVI

Application No./Patent No. : 201911043026
First Filing Date : 23/10/2019
Country : India

ABSTRACT

The novel features of the present invention have been realized by the non-obvious inventive steps of preparing a nanoporous, cylindrical, thin film of ?-Al203 by sol-gel process on hollow, sintered, cylindrical a-alumina substrate, duly cured and provided with cylindrical, thick film, gold electrodes on both sides of the material, and subjected to heat treatment to obtain a moisture sensor. The moisture sensor so obtained measures the change in capacitance due to moisture adsorption by porous sensing material under test and is capable of measuring gas moisture in trace level with appropriate sensitivity. Alongside fast response time a heating arrangement (80°±10°C) whereby a Kanthal heating coil is passed through the core of the hollow cylindrical substrate of the sensor enables the sensor to show fast recovery and makes it suitable for practical applications.

A PROCESS FOR PREPARING ARSENIC FREE(<10 ppb) WATER FROM ARSENIC CONTAMINATED GROUND WATER AND AN EQUIPMENT THEREFOR

S BANDYOPADHYAY, D KUNDU, S N ROY, H S MAITI

Application No./Patent No. : 231768
First Filing Date : 27/03/2001
Country : India

ABSTRACT

A process for preparing arsenic free (< 10 ppb) water from arsenic contaminated ground water, characterised in that mixing arsenic contaminated ground water with an homogeneous suspension in aqueous medium essentially containing fine particles of size below 20 μm of arsenic adsorbing media having concentration in the range of less than 5000 ppm, circulating the resultant mixture under pressure in the range of 0.1 to 3 Kg/cm^2 through one or more porous ceramic pressure filtration tubes of pore size in the range 1 to 10 μm of the said arsenic adsorbing media

A PROCESS FOR THE PREPARATION OF AN IMPERVIOUS PALLADIUM MEMBRANE OVER CERAMIC SUBSTRATE

S DASGUPTA, D BHATTACHARJEE, K MANDAL, T P SAHOO

Application No./Patent No. : 324557
First Filing Date : 20/08/2013
Country : India

ABSTRACT

Increasing energy demand needs alternate source of energy other than fossil fuels. Hydrogen is targeted as the energy source for next generation due to its environment friendly applications. Hydrogen present in lean natural gas, water gas and SMR reaction product has to be separated to get pure hydrogen to be used as fuel. Metallic Palladium/ Palladium alloy tubes (3 to 5 mm thickness) are long being used for separating the same from the mixture. Now-a- day's ceramic supported defect free Palladium membrane of thickness 2μm to 10μm is the best choice for making of pure hydrogen due to its cost effectiveness, performance and longevity. In the present invention a non-hazardous, eco friendly and cheaper process of making of Palladium membrane is described. Tailor made thickness achieved by this process may also find application in different areas of catalysis.

A PROCESS OF MAKING SINGLE LAYER ULTRAFILTRATION MEMBRANE INSIDE CLAY-ALUMINA POROUS TUBULAR SUPPORT

S N ROY, S SARKAR, G C SAHOO, S CERNEAUX, A LARBOT, S BANDYOPADHYAY

Application No./Patent No. : 3768DEL2012
First Filing Date : 07/12/2012
Country : India

ABSTRACT

The present invention relates to a process of making single layer ultrafiltration membrane inside clayalumina porous tubular support instead of multiple layer coating and a process thereof to make single layer coating having pore sizes less than 20 nm and atmost 50 nm is disclosed. A mesoporous membrane layer having an average pore diameter smaller than 50 nm is formed on the porous tubular support made of a mixture of clay and alumina with thickness from 1.0 mm to 3 mm; OD from 9 mm to 35 mm; ID from 6 mm to 25 mm; pore size from 0.5 to 2.0 μm. Ceramic slurry made of individual nanosized powder consisting of ZrO_2 and/or Al_2O_3 boehmite is deposited inside the porous tubular support, dried in air followed by firing to a temperature of atleast 4000°C and atmost 8000°C to form a ultrafiltration ceramic membrane having an average pore diameter in the range of 18 nm and less than 50 nm.

AN IMPROVED PROCESS FOR THE PREPARATION OF BORON NITRIDE COATED CARBON FIBRE

A K BASU, M DAS, S GHATAK

Application No./Patent No. : 270978
First Filing Date : 19/05/2008
Country : India

ABSTRACT

To improve the oxidation resistance of carbon fiber, a boron nitride coating was developed by a non hazardous and cost effective dip coat technique. Dip coating was carried out in saturated boric acid solution followed by nitridation to produce BN coating. Before dip coating the carbon fibers were chemically activated. Due to interaction of activating chemical agents during the activation treatment, the surface properties e.g. surface area, surface microstructure of the carbon fibers were significantly varied. These improvements of surface properties subsequently reduce the boron nitride coating formation temperature.

A PROCESS FOR THE MANUFACTURE OF DENSE NEODYNIUM STABILISED BETA SILICON NITRIDE ALPHA SiAlON COMPOSITE

S BANDYOPADHYAY, H S MAITI

Application No./Patent No. : 234988
First Filing Date : 28/03/2003
Country :India,USA

ABSTRACT

The present invention provides a process for the manufacture of dense neodymium stabilised ß-Si_3N_4 - α-SiAlON composite, wherein a synergistic composition essentially consisting of Si_3N_4, Al_2O_3, AlN, SO_2 and Nd_2O_3 as starting materials is mixed in proportion to make a total of 100 mole in the mixed batch, passing the powder through 100 mesh, pressing the powder to form green compacts, sintering the green compacts at a temperature in the range of 1700° to 1900°C in nitrogen atmosphere. The process of the present invention provides neodymium stabilised ß-Si_3N_4 - α-SiAlON composites by processing a composition from the system Si_3N_4 - Al_2O_3.AlN - Nd_2O_3.9AlN - SiO_2 resulting into dense product of the order of > 98% theoretical density with the advantages such as cost effectiveness, high hardness and high fracture toughness. The produced dense ß-Si_3N_4- α-SiAlON will be useful for low temperature applications such as wear parts like bearing and roller materials and particularly for grinding and milling operations like grinding balls.

A SYNERGISTIC COMPOSITION USEFUL FOR THE PREPARATION OF DENSE NEODYNIUM STABILISED BETA SILICON NITRIDE ALPHA SiAlON COMPOSITE

S BANDYOPADHYAY, H S MAITI

Application No./Patent No. : 233977
First Filing Date : 28/03/2003
Country : India, USA

ABSTRACT

A synergistic composition useful for the preparation of dense neodynium stabilised ß-Si_3N_4-α-SiAlON composite. The invention relates to a synergistic composition useful for the preparation of dense neodynium stabilised ß-Si_3N_4-α-SiAlON composite. The composition consists of a synergistic mixture of Si_3N_4, Al_2O_3, AlN, SiO_2 and Nd_2O_3. The cost effective synergistic composition is useful for the preparation of dense neodynium stabilised ß-Si_3N_4-α-SiAlON composite of the order of >98% theoretical density, having high hardness and high fracture toughness. The dense ß-Si_3N_4-α-SiAlON composite will be useful for low temperature applications as wear parts like bearing and roller materials and particularly for grinding and milling operations like grinding balls.

A SYNERGISTIC COMPOSITION USEFUL FOR THE PREPARATION OF IMPROVED SILICON CARBIDE POWDER

S BANDYOPADHYAY, H S MAITI

Application No./Patent No. : 234885
First Filing Date : 28/03/2003
Country :India,USA

ABSTRACT

The synergistic composition consists of a mixture of a source of pure silica such as silicon dioxide, a source of carbon such as activated charcoal, β-silicon carbide and a source of iron such as ferric nitrate. The cost effective synergistic composition is useful for the preparation of improved silicon carbide powder containing atleast 90% SiC preferably rich in the β-phase. Silicon carbide powder finds wide usage in the manufacture of products suitable for refractory and engineering applications.

A PROCESS FOR THE PREPARATION OF DENSE SAMARIUM STABILISED ALPHA SiAlON

S BANDYOPADHYAY, H S MAITI

Application No./Patent No. : 233579
First Filing Date : 14/03/2002
Country : India

ABSTRACT

The present invention relates to a process of making dense Samarium stabilised α-SiAlON by inventive steps of using compositions from the system Si_3N_4-Al_2O_3.AlN-Sm_2O_3.9AlN-SiO_2 resulting into dense product of the order of > 98% theoretical density with the advantages such as cost effectiveness, high hardness and high fracture toughness. The produced dense alpha-SiAlON will be useful for low temperature applications as wear parts like bearing and roller materials and particularly for grinding and milling operations like grinding balls.

A PROCESS FOR THE PREPARATION OF SILICON NITRIDE POWDER

S BANDYOPADHYAY, H S MAITI

Application No./Patent No. : 231037
First Filing Date : 28/02/2002
Country : India

ABSTRACT

This invention relates to a process for the preparation of silicon nitride powder. The process comprises homogenizing and powdering by conventional methods a composition essentially consisting of: 44-60 weight% SiO_2, 19-27 weight% C, 3.5-13 weight% p-Si_3N_4, and 11-26 weight% $Fe(NO_3)_3$. $9H_2O$, passing the powder through 100 mesh, pressing the powder so obtained by conventional methods to form green compacts, sintering the green compacts at a temperature in the range of 1475° to 1550°C in nitrogen atmosphere, grinding by conventional methods to obtain silicon nitride powder.

A PROCESS FOR THE PREPARATION OF SINTERED CUBIC GAMMA-ALUMINIUM OXYNITRIDE

K MUKHOPADHYAY, S BANDYOPADHYAY, H S MAITI

Application No./Patent No. : 226271
First Filing Date : 25/02/2000
Country : India

ABSTRACT

A process of preparing dense cubic gamma-aluminium oxynitride spinel is provided comprising the steps of reaching alpha-Al_2O_3 and AlN in nitrogen atmosphere without the use of external additive, breaking down the resulting agglomerate into powder, further sintering the precompacted powder in nitogen atmosphere into substantially homogeneous dense product of density >98% theoretical with an in-line transmission of at least 10% in the 0.3 to 5 μm wavelength spectral region.

A SYNERGISTIC COMPOSITION FOR THE PREPARATION OF SILICON NITRIDE POWDER

S BANDYOPADHYAY, H S MAITI

Application No./Patent No. : 230986
First Filing Date : 28/02/2002
Country : India

ABSTRACT

The present invention relates to a synergistic composition and a process for the preparation of silicon nitride powder from carbothermal reduction and nitridation of silica by inventive steps of introducing alpha-Si_3N_4 powder simultaneously with some iron in the starting composition resulting into a precursor powder after complete reduction and nitridation containing atleast 90% Si_3N_4 preferably rich in the alpha-phase with the advantages such as cost effectiveness.

A SYNERGISTIC COMPOSITION FOR THE PREPARATION OF DENSE SAMARIUM STABILISED ALPHA-SiAlON

S BANDYOPADHYAY, H S MAITI

Application No./Patent No. : 224574
First Filing Date : 14/03/2002
Country : India

ABSTRACT

The present invention relates to a synergistic composition for the preparation of dense Samarium stabilised alpha-SiAlON by inventive steps of selecting compositions from the system Si_3N_4 - Al_2O_3.AlN - Sm_2O_3.9AlN - SiO_2 resulting into dense product of the order of > 98% theoretical density with the advantages such as cost effectiveness, high hardness and high fracture toughness. The produced dense alpha-SiAlON will be useful for low temperature applications as wear parts like bearing and roller materials and particularly for grinding and milling operations like grinding balls.

A SYNERGISTIC COMPOSITION FOR THE PREPARATION OF DENSE DYSPROSIUM STABILISED ALPHA-SiAlON AND A PROCESS OF MAKING PRODUCTS THEREOF

S BANDYOPADHYAY, K MUKHOPADHYAY, H S MAITI

Application No./Patent No. : 232927
First Filing Date : 24/11/2000
Country : India

ABSTRACT

The present invention relates to a synergistic composition and a process for the preparation of dense Dysprosium stabilised α-SiAlON by inventive steps of introducing SiO_2 in the composition resulting into dense product of the order of > 98% theoretical density with the advantages such as cost effectiveness, high hardness and high fracture toughness.