Technology Offer

Laboratory method for producing aluminophosphate glasses doped with rare-earth ions

Summary

A Romanian R&D institute has developed a laboratory method to produce aluminophosphate glasses doped with rare-earth ions, (rare-earth-doped phosphate glass having high optical homogeneity and chemical stability), and to the preparation for these vitreous materials as optical sensors, Faraday modulators/rotators, etc. The institute is looking for SMEs/other entities interested in the implementation of the lab method to the experimental pilot, under research, technical cooperation and licensing.

Creation Date	18 December 2014
Last Update	06 May 2015
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Reference	TORO20141218002

Details

Description

The laboratory method for producing aluminophosphate glasses doped with rare-earth ions is referring to the rare-earth-doped phosphate glass having high optical homogeneity and chemical stability, as well as to the preparation method for these vitreous materials used as optical sensors, Faraday modulators/rotators, etc.
The laboratory method uses chemical reagents of analytical purity, such as: acids, oxides and salts. For the amount of raw materials, the partial volatilization of phosphorous and lithium oxide is taken into account.
The glass batch is heat treated to release the gaseous components, by continuous homogenization, drying and pre-melting treatments, and followed by melting, refining, casting in preheated graphite moulds and, finally, by the annealing the glass, so as to eliminate residual stress.
During the melting and refining steps, the glass is mechanically homogenized by using a ceramic stirrer, which works based on a preset program related to the duration and rotation speed.
Finally, the glass is mechanically processed in order to elaborate the samples so as to present the optical, structural, morphological and magneto-optical characteristics.
The main characteristics of the rare-earth-doped glasses are presented below:
-density: 2.17-2.90 g/cm3;
-thermal expansion coefficient: = 90-100 x 10-7/K;
-low annealing temperature: 435oC-450oC;
-vitreous transition temperature: 460oC-480oC;
- high annealing temperature: 460oC-490oC;
-softening temperature: 495oC-515oC;
-refractive index: nD =1.54-1.55 (λ= 589.29 nm), ne = 1.53-1.58 (λ=546 nm), nF = 1.54…1.59

(λ=656 nm), nC = 1.52…1.57 (λ=486 nm), nF – nC = 0.01-0.03;
-striae - Class 1 (control onto two directions);
-birefringence lower than 10 nm/cm (second class);
-optical homogeneity (refractive index change) - Class 1.
The Romanian R&D institute is looking for SMEs actively involved in the field of microelectromechanic systems (MEMS), microoptoelectromechanic systems (MOEMS), as well as other entities where optical glasses could be used as sensors, Faraday rotators, optical switches, etc., interested in implementing the laboratory method from the level of industrial research to the experimental development one (research and technical cooperation agreements), on the basis of a license agreement.

Advantages and Innovations

-a complex chemical composition of the doped glasses is to be taken into account, comprising alkali and alkali-earth oxides, aluminium oxide, phosphorous pentoxide and doping lanthanide oxides, generating new optical glasses with reproducible properties;
-high chemical stability of the doped glasses, prepared according to well-established chemical composition;
-high optical homogeneity provided by the wet-route laboratory method used to prepare these materials;
-melting and annealing temperatures of the implied doped-glasses are much reduced, as compared to traditional silicate glasses;
-low viscosity at the melting temperature providing a high tendency to form vitreous network;
-high optical transmission in UV-Vis range;
-higher capacity to embed rare-earth ions by comparison with silicate glasses;
-low linear and non-linear refractive index;
-high efficiency of the energy transfer for co-doped phosphate glasses.

Stage of Development

Available for demonstration

IPR Status

Exclusive Rights

Keywords

Technology

02007007	Glass

Market

08001015	Other speciality materials

NACE

M.72.1.9	Other research and experimental development on natural sciences and engineering

Network Contact

Issuing Partner

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Open for EOI : Yes

Client

Type and Size of Organisation Behind the Profile

Industry SME 11-49

Year Established

0

Already Engaged in Trans-National Cooperation

No.

Languages Spoken

English

Client Country

Romania

Partner Sought

Type and Role of Partner Sought

Partner(s) sought: SMEs specialized in the microelectromechanic systems (MEMS), microoptoelectromechanic systems (MOEMS), as well as other entities where optical glasses could be used as sensors, Faraday rotators, optical switches, etc.
Tasks to be performed by the potential partner:
- transfer and implementation of the laboratory method from the level of industrial research to the experimental development one – experimental pilot -, on the basis of signed research, technical cooperation and license agreements.

Type and Size of Partner Sought

SME 11-50

Type of Partnership Considered

License agreement
Technical cooperation agreement
Research cooperation agreement