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Glass surface engineering by thermal poling: Chemistry under field and design of surface electro-activity and optical properties for sensing

Surface engineering of optical glasses has been performed by thermal poling and the correlation between the local modification of the glass composition and the local structure of the field-induced modified surface has been investigated and controlled. Surface mechanical properties and durability can be affected, as well as optical properties, leading to numerous potential applications for sensing. The original approach is to spatially control the glass surface electro-activation at the microscopic level. Such a method allows manipulation of high static electric fields implemented within the glassy matrix just below the surface using a designed micro-patterned electrode. Preliminary results demonstrate the capability of this thermo-electrical imprinting process to modify the sign and the strength of the surface potential of glass down to the micrometer scale. A modeling approach has been proposed enabling to tailor the geometry and distribution of the frozen-in electric field. These preliminary results are unique and open the way for an electro-active surface chemical engineering on materials of great interest for applications in the Visible-IR domain like GRIN lenses or. Bio-selective reactivity, for respectively optical and biosensing.

Speaker Biography

During 30 years in the University of Bordeaux, Fargin Evelyne has focused her research interests on - Nonlinear optical properties of glasses- Surface Glass structuring by poling - Heavy glass oxides for fiber applications- Laser-induced defects in glasses - Multiscale crystallization in amorphous transparent glass materials (over 120 publications, 3 patents, H-index=21). She has International Involvement on Research and Education programs in the University of Bordeaux as International Partnership Coordinator of the Lasers and Photonics Graduate School in Bordeaux EUR LIGHTST and Training Coordinator of the LaPHiA Center of Photonics.

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