

# New Perspectives of the Silicates Based Materials: From Classical To Emerging Applications of Glasses

**Cornelia ILIE<sup>1-3</sup>, Ludmila MOTELICA<sup>1-3</sup>, Denisa FICAI<sup>2-4,\*</sup>, Roxana Doina TRUSCA<sup>1-3</sup>, Ovidiu Cristian OPREA<sup>2-5</sup>, Anton FICAI<sup>1-3,5</sup>**

<sup>1</sup>Science and Engineering of Oxide Materials and Nanomaterials, Faculty of Applied Chemistry and Materials Science, University POLITEHNICA of Bucharest, Gh. Polizu 1-7, 011061 Bucharest, Romania; gabriela.petrisor06@yahoo.com (G.P.); motelica\_ludmila@yahoo.com (L.M.); truscaroxana@yahoo.com (R.D.T.); Adrian.vasile@upb.ro (AVS); georgeta.voicu@upb.ro (G.V.); anton.ficai@upb.ro (A.F.);

<sup>2</sup>National Research Center for Food Safety, University POLITEHNICA of Bucharest, Splaiul Independentei 313, 060042 Bucharest, Romania; ovidiu73@yahoo.com

<sup>3</sup>National Center for Micro and Nanomaterials, University POLITEHNICA of Bucharest, Splaiul Independentei 313, 060042 Bucharest, Romania

<sup>4</sup>Department of Inorganic Chemistry, Physical Chemistry and Electrochemistry, Faculty of Applied Chemistry and Materials Science, University POLITEHNICA of Bucharest, Gh. Polizu 1-7, 011061 Bucharest, Romania

<sup>5</sup>Academy of Romanian Scientists, Ilfov Street 3, 050044 Bucharest, Romania

\*Corresponding author: gabriela.petrisor06@yahoo.com

Silicon and oxygen are some of the most abundant elements of the earth being mainly found in the nature as silicates. Among many applications, large amounts of glasses are produced for many specific applications. However, there are some emerging applications which are increasingly gaining attention. The classical applications of the glass involve windows (automotive, house, etc.), glass fibers and fabrics (resin based composites with uses in building materials, automotive and domestic applications, ...), sensors (especially pH electrodes), glassware for laboratories as well as domestic use, etc. Since over 50 years from the discovery of the bioactive glasses by L. Hench, bioglasses are increasingly used in hard tissue engineering but also in several applications including soft tissue engineering. Bioglasses, once doped with adequate ions, can get antimicrobial activity or can enhance the healing rate or the vascularization of the new tissues. The surface modification of the glasses can be exploited to induce new functionalities of the surfaces. It is well known that coatings are already implemented in several industries, such as automotive or pharmaceuticals. For instance, automotive glass windows are coated with various layers to assure specific properties including: antiadherence, self-cleaning, antifogging, antireflection, etc. But, new surface modifications are still desired and needed.

Thus, adherent or antiadherent surfaces are expected to be useful in specific forensic applications to take fingerprints or to avoid their tendency to remain on different surfaces; sensitive surfaces able to specifically adsorb analytes (including heavy metals, dyes, antibiotics, pesticides, etc.) for the specific accumulation of these analytes and finally to analyze them by specific techniques. Multiple areas can be specifically modified to develop arrays with complex sensing activity. In the current work, we are focusing our researches in modifying the surface of the glass slides by a self-assembled methodology, as schematically presented in Fig 1.

**Keywords:** *glass; surface modifications; emerging applications;*

**Acknowledgements:** *This research was funded by UEFISCDI through TE95/2022: "Functionalization and decoration with nanoparticles of the glass surface: A promising approach to induce new applications"*

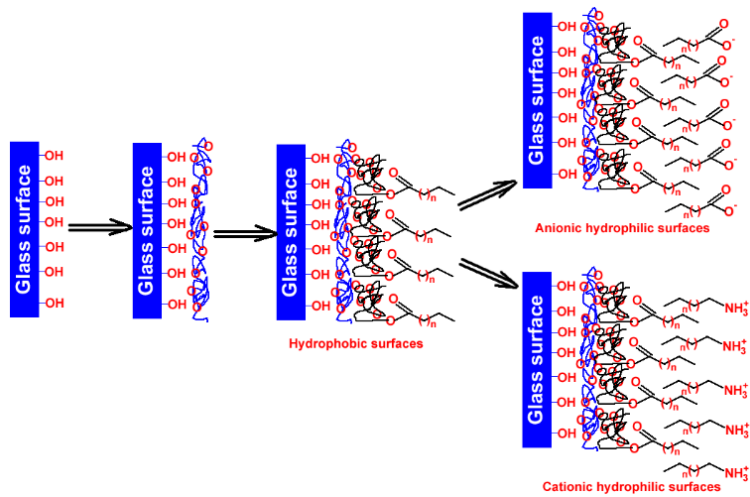


Figure 1. Schematical chemical modification of the glass surface