
Glass characterization by Raman microscopy, Glow Discharge Optical Emission Spectrometry and Spectroscopic Ellipsometry

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Abstract

Whether in construction, automotive or transport, the use of glass is constantly increasing. Glazed surfaces no longer serve simply to allow the natural light in and the occupants to see outside, but they can become truly multifunctional materials by combining a wide number of properties. Glass is also designed to optimize solar energy conversion. The analysis of inclusions and bubbles in bulk, the control of coatings on surfaces, the monitoring of ion exchange involved in the strengthening are some examples of challenges to take up in glasses technologies.

The portfolio of HORIBA Scientific offers different techniques that are optimized for the investigation of elemental, structural and optical properties of glasses.

Confocal Raman microscopy offers the possibility to detect, characterize and identify glass imperfections. Thanks to the high confocality, it is possible to well characterize "glass nodes", bubbles gas, zirconia or other types of inclusions.

With the use of Pulsed Radio Frequency source (pulsed RF), Glow Discharge - Optical Emission Spectroscopy, offers the possibility of depth profiling tens of microns of glasses without inducing thermal stress allowing monitoring ion exchange processes (IOX) or studying thin layers (down to the nanometre) on top of the glasses as in PV.

Last, but not least, Spectroscopic Ellipsometry (SE) enables to determine thickness and optical constants of thin films with a sensitivity at the atomic scale. It can be applied to improve processes of anti-reflection or mirror structures, to study electrochromic glasses such as WO₃ or to identify and characterize the air and tin sides of float glass. Applied to bulk glass, SE can measure absorption curves or residual birefringence.

This presentation will illustrate solutions proposed by HORIBA Scientific for glass materials applications both in research and industry.

Keywords: Glass characterization, Raman microscopy, Glow Discharge Optical Emission Spectroscopy, Spectroscopic Ellipsometry

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