Ultra fast depth profile characterisation of plasma coatings on polymer surfaces: GD-OES and Plasma Profiling-TOFMS

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Both GD-OES and Plasma Profiling-TOFMS (also named as rf-GD-TOFMS) provide direct measurement of the chemical composition of thin and thick layers with nanometre depth resolution. These techniques rely on the fast sputtering of a large area of the material of interest by a high density ($10^{14}$) and low energy plasma. The unique characteristics of this plasma allow very fast erosion (2-10 nm/s, several microns per minute) with minimum surface damage (as the incident particles have an average energy of about 50 eV) making it an important companion tool for the characterisation of plasma coatings and for sample preparation before SEM analysis.

Both instruments feature an advanced pulsed RF source permitting operation with minimum induced thermal effects thus allowing the measurements of non conductive and fragile materials.

In addition, Plasma Profiling TOFMS makes use of the transient signals generated by the pulsed RF potential are monitored. Three dimensional data are thereby available: mass spectra, source profile, and depth profile. The time-resolved source profile features intense signals in the plasma extinction phase (once the RF is turned off—the so-called afterglow region), which are extracted for high sensitivity. In addition to this analytical benefit, source profiles may contain a lot of information about the plasma/sample interactions.

Sample preparation will be shown and comparative results between OES and TOFMS will be discussed.

Keywords
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