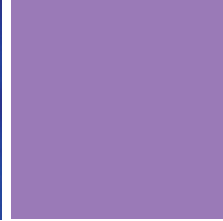
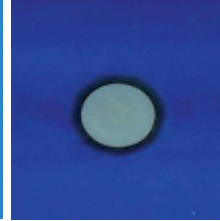


GDOES

**“UFS”:
a patented key development for
GDOES by HORIBA Scientific**



Application
Note

Instrumentation
GD21

Patrick Chapon, HORIBA Scientific, 16 rue du Canal, 91160 Longjumeau, France

Abstract

The UFS, Ultra Fast Sputtering, combines, by a plasma gas change, the sputtering of the material with specific induced chemistry and offers Ultra Fast and Sensitive Profiling of materials with polymeric layers.

Key words

Polymeric layers, negative electrodes for Li, Ultra Fast Elemental Depth Profile.

Introduction

In many cases, polymer layers can be extremely thick (10-100 µm). Even with pulsed RF operation the sputtering of such layers has to be done slowly, with soft operating conditions, in order to minimize unwanted sample degradation. This leads to long analysis times and often poor crater shapes affecting the depth resolution and limiting the practical use of the GD technique for these applications.

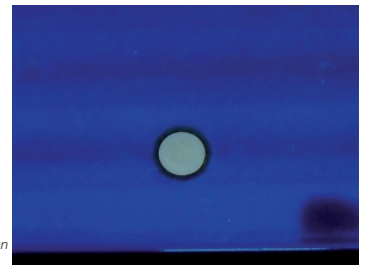
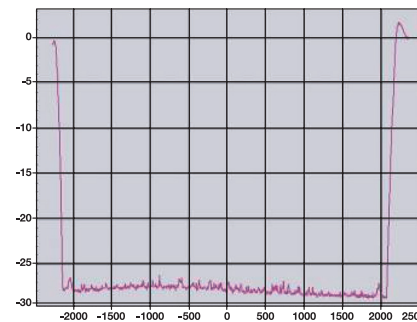
To take an example from the automotive industry, it is known that painted car bodies, for instances, have to be sputtered for nearly one hour before the metallic layers below the paint can be reached when inorganic multi-layers can be profiled in minutes. Another example is about the analysis of the negative electrode for Li ion batteries.

The patented “UFS” offers an attractive solution for such materials.

Patents

The “UFS” is a major development by HORIBA Scientific and one of our key patents for GD. The patent is extended to all key countries and marks the leadership of the company in the field of Glow Discharge Optical Emission.

Application to polymeric layers



GD crater obtained on a plastic car part covered with an organic layer – over 25 µm were sputtered in 3 min

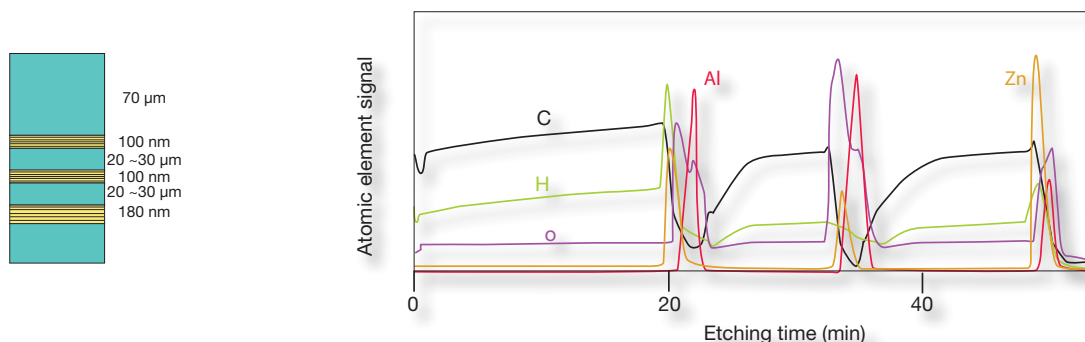
The idea of the UFS is to combine, by a plasma gas change, the sputtering of the material with specific induced chemistry favouring chain-scission reactions. Many polymers used in different fields (PMMA in organic electronics, top varnish on car bodies, encapsulation layers of PV cells etc) are for instances very sensitive to such combination.

Application No.	Application Date	Publication No.	Kind	Recorded Date	PRS Code	Event Group	Event Details
EP20110306147	20110914	EP2434275	A1	20120328		LSFB	Published
		EP2434275	A1	20120328	+AK		Designated Contracting States Kind code of Ref document: A1
		EP2434275	A1	20120328	+AX		Designated states: 30 States Extension or Validation Of the European Patent To Countries concerned: 2 States Request For Examination Filed Effective date: 20120917
		EP2434275	A1	20120917	+1P		
		FR2965355	A1	20120330		LSFB	Published
		FR2965355	B1	20130910		LSCT	Granted / Extended (supplementary Protection Certificate)
JP20110209800	20110922	JP201208247	A2	20120405		LSFB	Published

“Patbase” screen copy, showing the status of the UFS patent

Depth Resolution on embedded layers

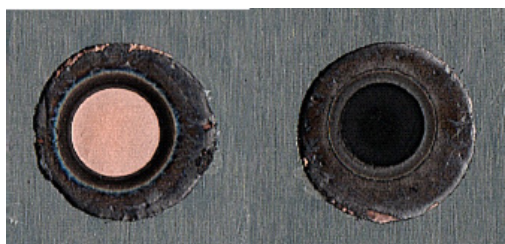
The speed of analysis with UFS is much enhanced improving the signal/noise ratios. It also permits to readily measure thin embedded layers with excellent depth resolution. The example below is a perfect illustration: sample is a DVD featuring layers in 100nm perfectly resolved below a 70 microns thick polymeric layer.



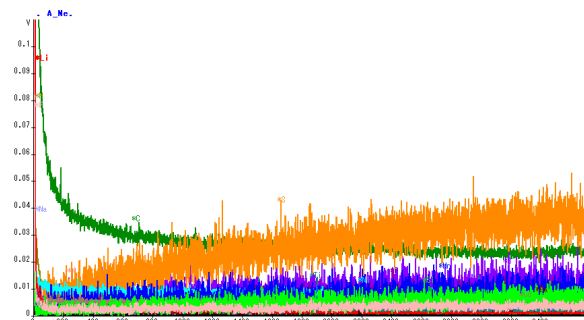
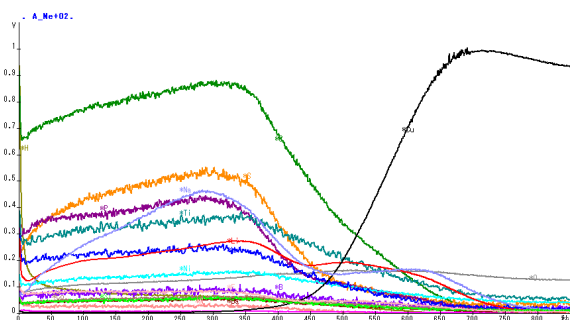
Negative electrodes of Li batteries

The UFS is not only beneficial for speed and depth resolution, it also permits to enhance the sensitivity of the GD measurements. If the erosion rate is slow (which sometimes is the case when soft, pulsed RF conditions have to be used to preserve the integrity of the material), few materials enter the plasma per unit of time and therefore the sensitivity is degraded.

With UFS it is possible to sputter much more rapidly (40 times in the example shown below) the same material with the same soft pulsed RF conditions. The sensitivity is therefore much better.



Left: measurement with UFS 70 microns are sputtered in 10 minutes and the Cu foil substrate is reached
Right: Without UFS, 11 microns only are sputtered in 1 hour



Conclusion

For organic layers, the new patented « UFS » device increases speed and light by at least a factor of 20 while the pulsed operation preserves the quality of the depth profile.



HORIBA
Scientific

info.sci@horiba.com

USA: +1 732 494 8660
UK: +44 (0)20 8204 8142
China: +86 (0)21 6289 6060

France: +33 (0)1 69 74 72 00
Italy: +39 2 5760 3050
Brazil: +55 (0)11 2923 5400

www.horiba.com/scientific

Germany: +49 (0)89 4623 17-0
Japan: +81 (0)3 6206 4721
Other: +33 (0)1 69 74 72 00