

Products and Technologies of the Emission Division

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Since 1819, Jobin Yvon (JY) has always been a very innovative company in the field of optics. The most talented specialists in optics designed a wide variety of optical systems and some of them still remain as references at the beginning of the 21st century. L. Laurent or C. Fabry designed and developed systems today still recognized by the name of their inventors. This historical expertise in optics and also in the field of optical spectroscopy has been the strong foundation for the development of the Emission Division inside JY. Since 1977, the group has developed and introduced numerous successful products in the field of Atomic Emission such as Spark, Inductively Coupled Plasma (ICP) and more recently Glow Discharge Spectrometer (GDS). These innovations have made the Emission Division one of the world leaders in the field of Atomic Emission Spectroscopy.

1 Introduction

The Jobin Yvon (JY) Emission Division activity consists of developing, manufacturing, marketing, selling and servicing Spark, ICP and GDS systems. The division is based in Longjumeau, France where the instruments are manufactured. We use, for worldwide sales and service, the support of a very dense network of distribution including agents, sales representatives, subsidiaries and HORIBA. Today, we cover more than 50 countries dispatched on 5 continents.

Since the integration of JY in the HORIBA Group, the Emission Division also received the responsibility for the distribution of some of the key products of the HORIBA Analytical Division. Since 2000, we are in charge in Europe of the marketing and the sales of the EMIA/EMGA family of elemental analyzers and more recently of the SLFA, sulfur-in-oil analyzers.

2 Inductively Coupled Plasma (ICP) Spectroscopy

JY introduced its first ICP in 1977 based on the state-of-the-art optical Czerny Turner monochromator. The technique based on the excitation of atoms from a liquid sample by an argon plasma was revolutionary at this time. The high temperature (around 8000 °K) allowed the excitation of most of the elements of the Mendeliev table from the light elements easy to excite (Li, etc.) up to the heavy metals (Th, U, rare-earth elements, etc.). This also allowed the excitation of the most refractory elements (W, etc.).

It became apparent very quickly that most of the elements were producing very rich and complex spectra. The use of very high resolution optical systems became an absolute necessity to optimize the technique. The complexity of some of the matrices to be analyzed also required optical systems providing high stray light rejection.

Our first JY 38 with its 1 meter focal length monochromator and high groove density holographic grating was the perfect response for such a challenge.

Today, the ULTIMA 2 (Fig. 1) the flag ship of the JY ULTIMA family is the latest evolution of this first instrument. The ULTIMA 2 was introduced in March 2001 at the Pittsburgh Conference in Orlando, Florida. It is the result of a fruitful collaboration between the JY and HORIBA R&D teams. We combined both the JY expertise in optics and ICP spectroscopy



Fig. 1 ICP Optical Emission Spectrometer ULTIMA 2

and the HORIBA strength in engineering and electronic. The ULTIMA 2 has not only been a commercial success but also recognized by specialist as one of the most innovative instruments during the conference.

With the ICP product line, we address mainly the environmental, chemical, biochemical, medical, pharmaceutical market as well as the metal industry, mining and the field of semiconductors.

Every year, more than 1300 ICP's are sold worldwide.

3 Spark Optical Emission Spectroscopy

Spark Emission is mainly dedicated to the analysis of conductive solid samples. The main fields of application remain the steel industry and foundries for quality control. After a small preparation (surface preparation) the sample is excited by very high energy spark. The excitation induces a light emission which is analyzed with a special optical assembly called a "polychromator". All elements are analyzed simultaneously by multiple detectors (photomultipliers); results



Fig. 2 Spark Optical Emission Spectrometer METALYS

can be obtained within a few seconds. This very fast technique has been widely employed since more than 45 years and around 1500 systems are sold every year worldwide. JY introduced its first unit (JY48E) in 1977 ; the latest generation of JY Spark is the JY METALYS (Fig. 2). This instrument is dedicated to standard applications such as Aluminum basis, cast iron, etc. and uses our standard 0.5 meter focal length optic equipped with a 3600 grooves per mm ion etched blazed holographic grating.

4 Glow Discharge Optical Emission Spectroscopy

The most recent technique developed by the division is the Glow Discharge Optical Emission Spectroscopy (GD-OES). The first installation was in 1984.

In glow discharge, the sample (solid) is placed and mechanically fixed onto a lamp. The sample plays the role of the cathode. Argon is introduced in the lamp where a radio frequency potential is applied inducing an ionization of the inert gas. The bombardment of the sample by

accelerated ions of argon creates a uniform sputtering. Sputtered atoms are then excited by collisions, producing an optical emission analyzed by the spectrometer.

JY has been the pioneer introducing in 1992 the first commercial GD-OES using a radio frequency (RF) source. Unlike the standard DC design, the RF source allows the analysis of conductive and non-conductive material for bulk but and depth profiling analysis. The system allows simultaneous analysis of several elements including gases (N, O, H, and Cl) versus depth.

GD-OES is used in the field of metal analysis (for bulk), and also for measurements of coatings, thermal treatment as well as surface and thin film analysis. The targeted industries are the steel producers, the automotive industry and field of semiconductors.

JY offers the GD PROFILER Series of GD-OES instruments consisting in 2 models, the GD PROFILER and the GD PROFILER HR. The 2 differs only in regards to the focal length of their respective polychromators (0.5 m and 1.0 m). The JY 5000 RF is an additional model only distributed in Japan. The GDS market at around 80 units per year is today the fastest growing market in the field of Atomic Emission Spectroscopy.

5 | HORIBA EMIA/EMGA and SLFA

Since 2000, the JY Emission Division became the exclusive distributor for the EMIA/EMGA HORIBA product line in Europe and the Middle East. This was extended to North America in March 2001. More recently, the group has been asked to also distribute the SLFA Series in Europe and the Middle East. These 2 product lines present a strong synergy with our traditional systems for elemental analysis and a real potential of development in this part of the world.

6 | Conclusion

Today, the Emission Division of JY offers a large range of techniques for elemental analysis. The combination of 180 years of experience in optics and the HORIBA expertise in manufacturing quality is the essence to provide superior solutions for most of the analysts. The co-development of new products is the future way of success. The Emission Division has been a pioneer with the ULTIMA 2.



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