

Welcome to the May 2025 edition of LPD Lab Services Newsletter

LPD Lab Services are the experts in materials, chemicals, technical engineering and scientific problem solving for products and manufacturing processes across all sectors within Quality, Facilities, Manufacturing, Engineering, Product and Process, Development and Research. LPD Lab Services develop innovative and practical analytical solutions, as well as bespoke testing methods for in-process manufacturing, finished products and field failure, plus help develop new production processes, products and materials. Staff pride themselves resolving some fascinating and complex technical problems from across diverse product ranges and sectors of industry. The laboratory offers pragmatic scientific and engineering solutions, with timely response times and clear communications, which are all core to the company's business model.

This Edition at LPD Lab Services:

- **X-Ray Fluorescence (XRF)**
- **X-Ray Photoelectron Spectroscopy (XPS)**
- **Problem-Solvers and Technical Thinkers - Our Team behind The Lab: Meet Mike Ellicott Senior Chemist Specialist and Quality Director**

X-Ray Fluorescence (XRF)

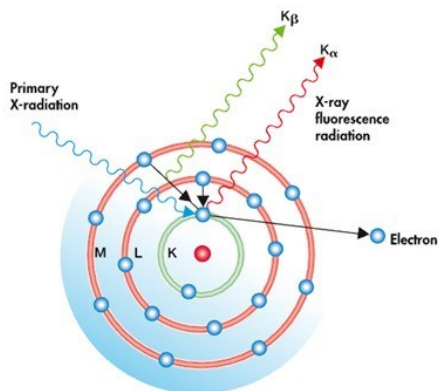
Elements can be uniquely identified through X-ray emission from the atoms present. The advantage of XRF spectroscopy using a wavelength dispersion detector rather than energy dispersion is that it gives orders of magnitude more sensitivity. The technique can separate elements that have overlapping X-ray lines because of its higher resolution.

The technique can be operated as quantitative or semi-quantitative for samples. Metals can be characterised for multiple elements using calibration standards for steels and aluminium alloys with limited preparation requirements unlike AAS and ICP-MS where they need acid digestion and XRF can be used for RoHS3 (Restrictions on Hazardous Substances) screening.

Semi-quantitative analysis can analyse 'unknown' elements (above carbon in the periodic table – hence semi-quantitative) down to levels of 0.01 weight%. The technique can be used as a cost effective starting point to determine if elements are there, to guide more involved assay work such as AAS or ICP-MS if still required

XRF can also measure or be calibrated for samples that contain high levels of a known element which would require dilution for many other techniques to measure.

The diverse range of samples that can be analysed include bulk powders / minerals / dusts, solids, plastics, metals, rubbers, thin film samples such as filter papers with dust / residues on them. Many samples can be homogenised using ball



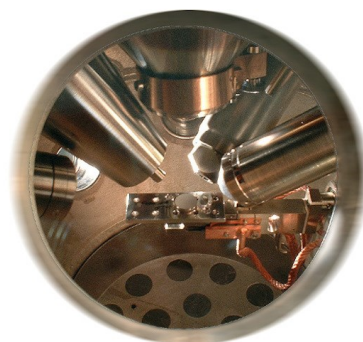
X-Ray Photoelectron Spectroscopy (XPS)

X-Ray Photoelectron Spectroscopy (XPS) is a surface specific analytical technique which analyses the topmost couple of atomic layers. During the XPS analysis soft X-rays are used to excite core-level electrons from the sample surface. These excited electrons, called photoelectrons, are emitted from the sample. The kinetic energy of the emitted photoelectrons is measured and converted to Binding Energy of the electron to the nucleus. This provides information about the elemental composition and chemical states of the elements present via chemical shifts. This chemical bonding information is something that not many analytical techniques can boast.

The surface sensitivity makes it an excellent choice for testing adhesion problems, delamination and surface contamination and production cleaning issues. XPS is the technique of choice particularly when the aim is to determine where exactly in the stack of layers the delamination occurred in a multilayered coating / material.

XPS capability of not only detecting elements but also their chemical states, makes XPS an analytical tool of choice for differentiating between compounds containing the same fingerprint elements: Is it ferrous or ferric? Is there silicone on the glass (silica) or not?

XPS is also extremely useful in the analysis of polymers. It is used in identification and quantification of additives, contaminants and functional groups, as well as degradation studies due to its capacity to detect changing chemical states which includes surface degradation from chemical or environmental attack such as UV radiation damage of PVC.



**Problem-Solvers & Technical Thinkers - Our Team behind The Lab:
Meet our Chemistry Specialist and Quality Director Mike Ellicott**



Q: Why have you been so successful at science during your career?

I have always been very practical in my approach to science, often tackling problems that have remained unsolved for years in a variety of different industries until I have put my problem-solving skills to the test and arrived at acceptable solutions. Prior to joining LPD Lab Services, notable merits and highlights in my career would be:

- I have adjusted chemical processes to improve biocide purity for export.
- Built and patented a dissolved nitrogen analyser for the beverage industry.
- Optimised centrifuge performances to improve beverage product quality.
- Helped develop the self-cooling can technology
- Developed retarded aluminium powder for the concrete block industry.
- Developed novel colour shift pigments for the automotive industry.

At LPD Lab Services, I have used my knowledge of Chemistry and Industrial Processes to help our customers improve their processes and understanding of their problems in the varied technical reports.

Q: What led you to be part of the very successful LPD Lab Services team?

I was incredibly lucky to be able to join the LPD Lab Services team here in Blackburn following my second redundancy across my career back in 2007. That lasted about 2 years and 1 day until the company that owned the laboratory went into administration in 2009. I suppose being made redundant a third time was a turning point but, as they say, being in the right place at the right time allowed me and some of my colleagues to buy out the assets from the administrators and continue trading as LPD Lab Services Limited. Under Steve Jenkins leadership, the company has steadily grown to be the highly bespoke successful analytical laboratory and consultancy it is today.

Q: Where do you see yourself in the next 5 years?

Alas, I have reached an age where retirement beckons and expect to gradually phase out of active service in the business over the coming years and welcome newer younger team members to participate and grow the business going forward. I am currently passing on my knowledge of Quality Manager to our Senior Metallurgist Danie Els, who will continue with the role as I move towards retirement. The company has been successfully recruiting experienced staff to grow the company's capabilities and build a legacy organisation to continue the work our clients so value. As I expect to remain in Blackburn, I may be called upon to help out on a technical level at peak times if requested as others have done before.

