

Spectrolaser Lanthanide Series Investigations

The *lanthanide series* is a series of metallic elements, with atomic numbers 58 through 71, which are - in order of increasing atomic number - cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium. They have numerous commercial uses based on their individual chemical, optical and nuclear properties. Example of commercial uses include their use in control rods in nuclear reactors (gadolinium, dysprosium), as colours in glasses and enamels (praseodymium, neodymium, cerium) and as constituents in laser medium and solid state devices (neodymium and terbium).

Lanthanides are often measured by spectroscopic means such as Atomic Absorption Spectroscopy (AAS) and Inductively Coupled Plasma (ICP) optical emission spectroscopy. These methods involve acid digestion of the matrix prior to analysis. Direct analysis methods such as XRF can be problematic as the *L* series transitions used to analyse these elements often overlap the *K* series fluorescence from transition elements.

The Spectrolaser Solution

The Spectrolaser uses a technique known as Laser Induced Breakdown Spectroscopy to directly determine the elemental concentrations of lanthanides in materials. The examples below of lanthanide determination in a graphite matrix illustrates that determinations of dilute concentrations (low ppm) in many matrices is possible.

