

Cheap, Fast, and Good

There is a saying that when it comes to service, you can have almost anything you want but you have to obey the Cheap/Fast/Good rule. In other words, you can't have it cheap, fast, and good...all at the same time. Ordinarily, as it goes, if you want something done cheap, it won't be fast and it won't be good. If you want it done fast, it won't be cheap and it won't be good. And finally, if you want something done good (well?), it won't be cheap and it won't be fast. Microscopical analysis, especially with the Polarized Light Microscope (PLM), may be the only possible exception to this rule.

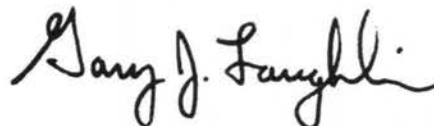
The service that a microscopist provides is like many others in the analytical community and is usually related to the characterization and identification of substances of unknown quality and quantity. However, unlike other instruments, it has more universal appeal and can be applied toward the entire range of scientific disciplines. It has been known to help answer (and sometimes completely answer) questions asked by astronomers, biologists, chemists, physicists, and earth scientists. It is particularly useful when the substance of interest is solid, semi-solid, crystalline, semi-crystalline, transparent, semi-transparent, and of either animal, vegetable, mineral or other origin; in other words, almost anything. It sounds too *good* to be *cheap* and *fast*, doesn't it?

Or does it? By comparison to most other laboratory equipment, a light microscope is cheap. A basic PLM costs only about double the price of a precision analytical balance! The microscope magnifies objects that are too small to be seen with the unaided eye to a size so that they can be characterized and identified...for free. In the hands of a properly trained microscopist, the PLM rarely needs maintenance and requires only 6-12 volts of electricity and 30-100 watts of power to operate; just a few dollars a month when used frequently.

Fast? Light microscopy is very fast. An ordinary analysis rarely takes more than several minutes, and almost never more than several hours, to complete. Within that time, substances on a properly prepared microscope slide can be characterized by all of their most important physical and optical properties: shape, size, color, transparency/opacity, pleochroism, average refractive index relative to the mounting medium, relative refractive indexes relative to the mounting medium, isotropy/anisotropy, birefringence (qualitative), birefringence (quantitative), extinction characteristics, optic sign, and sign of elongation. These are the easily observed characteristics that lead to recognition and positive identification of substances. Given a few additional minutes, the microscopist can determine crystal system, Miller indices, relative fracture hardness/softness, magnetic susceptibility, luster, solubility, and a host of other properties.

Good? It is good! The PLM can do all this on single particles a micrometer in diameter and weighing as little as one picogram including mixtures of single particles of almost any sort.

Cheap? Fast? Good? Yeah, that's the Microscope!



Editor