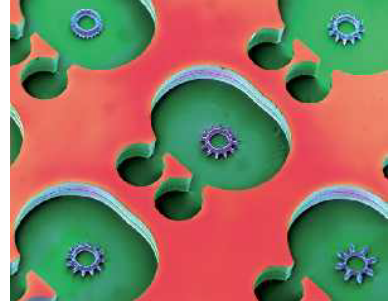


When Size Does Matter!

The Problem

The application of microsystems and nanotechnology to fundamental problems is set to be one of the growth areas of science in the 21st century. Technological breakthroughs are coming thick and fast and the proliferation of nano companies shows no sign of abating. The market for nanopowders is small but growing rapidly. Already there are over 70 producers in the world but they are small scale. Application areas extend from drug delivery to electronics to printing to cosmetics.



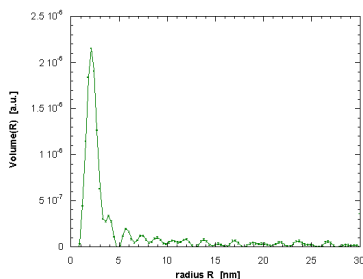
Amongst all of this activity, there is one area which appears to be lagging, that of nanometrology. One of the major problems with the nano world, is that the scale is below that of the wavelength of visible light and consequently, conventional measuring techniques, such as light scattering, are inadequate. This is particularly problematical when characterising nanopowders.

The Challenge

CLIK were approached by one of the largest organisations involved in the nanopowders field. Although at the forefront of this revolution, and with cutting-edge technology to produce a vast range of highly desirable powders, our customer was at a loss when it came to quality control and certification. Although small angle X-ray scattering (SAXS) is regularly used for particle size analysis, the scale of the particles in question brought a special set of problems. The particle size of the powders was thought to be in the range 1–100 nm – standard laboratory SAXS equipment does not have good enough resolution.

The Solution

CLIK, with their access to the range of facilities on the Synchrotron Radiation Source (SRS) at Daresbury Laboratory, were able to use the knowledge of some of the world's experts in X-ray metrology. Beamline 2.1 on the SRS can be used to look at particles in the size range 1–200 nm and so is ideal for looking at nanopowders. With computer-controlled sample changers which are linked to the data acquisition software, it is possible to accurately screen several samples an hour using this technique. An example of the data produced is shown on the left – this particular sample has particles predominantly in the 2–4 nm range.



Results such as these allow manufacturers to introduce quality control into their processing operation. There is also the additional benefit of being able to give their customers a definitive measure of the quality of samples that they are purchasing.

The Benefits

Access to a uniquely accurate methodology with international credibility.

No other technique is capable of providing such high resolution with such detailed distribution plots.

A fixed cost per sample allows for easy budgeting with no additional, unforeseen overheads.

For further information on this case study or advice on other problems, contact:
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