s6.m21.p2 **Advances In X-Ray Optics: Improving The Performance Of Sealed Tube Based Diffraction Systems.** Anita Coetzee, Bram Schierbeek and Arjen Storm, *Bruker Nonius BV, Oostsingel 209, 2612 HL Delft, The Netherlands. E-mail: anita.coetzee@bruker-nonius.com*

Keywords: X-ray optics; CCD detectors

New generation sensitive CCD detectors in combination with recent advances in X-ray optics, have brought problems that were traditionally intractable within scientific reach. With the addition of optics the intensity obtained from a standard sealed tube generator can be significantly increased over the traditional graphite monochromator. Monocapillary glass optics can easily be added to a system. These optics focus the beam, based on total external reflection of x-rays on smooth surfaces. Combining graded multilayer optics [1] with a sealed tube generator allows for the exclusion of a monochromator, since this optics will monochromate the beam. These optics can be configured for maximum parallelism of the beam (Göbel mirrors) or in a side-by-side Kirkpatrick-Baez scheme as conceived by Montel in the 1950's [2] to optimize flux density. This study reviews the advances in optics for Cu radiation, giving representative examples of samples which have been studied, using a sealed tube X-ray generator in combination with a sensitive CCD detector, combined with different optics. Typical results obtained on small crystals of organic molecules, absolute structure configuration of natural products and pharmaceuticals and the screening of proteins are presented.

[1] H. Göbel, *38th Annual Denver Conference*, 1-5 August 1994, Steamboat Springs, Colorado, USA.
H. Göbel, *ACA meeting*, Pittsburgh, 1992, Paper I01.
[2] M. Montel, *Optica Acta*, **1**, 1954, p. 117.
M. Montel, *X-ray Microscopy and Microradiography*, Vol. **5**, 1957, pp. 177-185.

s6.m21.p3 **DARTS - The Commercial Service at the UK Synchrotron Radiation Source,** Elizabeth J. MacLean, Chris J. Pickles, A. Jane Whittington and John R. Helliwell, *CCLRC Daresbury Laboratory, Warrington, WA4 4AD, UK. E-mail: darts@dl.ac.uk*

Keywords: Synchrotron; Industry; Crystallography

The Daresbury Synchrotron Radiation Source (SRS) provides state-of-the-art analytical techniques from infrared to hard X-ray wavelengths. The unique characteristics of synchrotron radiation are ideal for analytical problems that require high spatial or temporal resolution or problems that are simply intractable using conventional instruments.

An increasing number of large-scale facilities exist worldwide, but are traditionally used by universities and higher education institutions for pure research and development. In recognition of the needs of commercial customers, Daresbury Laboratory established *DARTS* (Daresbury Analytical Research and Technology Service) [1]. *DARTS* offers unique services which can be tailored to the needs of the customer, allowing access to synchrotron analytical facilities and also the significant expertise and knowledge of staff on site. The analytical portfolio offered by the facility encompasses imaging, spectroscopic and structural characterisation techniques. *DARTS* also has links to conventional analytical houses for standard analyses should these be required prior to use of the synchrotron. The nature of problems and issues solved by *DARTS* is varied and includes: investigations of product failure and non-conformance, manufacturing issues, basic R&D and information used in expert witness legal cases.

More specifically, the crystallography services encompass protein crystallography from crystallisation to refined data [2]; small molecule crystallography [3]; wide-spread applications of powder diffraction; and small angle X-ray scattering measurements. We present here examples of work done using the service in all of these areas of scientific interest.

[1] www.darts.ac.uk
[2] J.M. Boulter, M. Glick, P.T. Todorov, E. Baston, M. Sami, P. Rizkallah, B.K. Jakobsen *Protein Engineering*, **16**, 707-711, (2003)
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