m02.o02

A New Technique and Device for 3D Imaging of Crystals while still in Solution

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The viewing of crystals in drops has basically stayed the same for the last 70+ years. Now, a novel, new 3D digital video microscope system developed specifically for crystallographers will change all that. The presentation will cover the use of this new and exciting technology that is compatible with all known plates types, as well as styles of drop preparation (hanging drop, sitting drop, or under oil). There will also be a discussion regarding the potential advantages of 3D imaging as it relates to presentations, scoring, beam line crystal placement, patent opportunities, documentation, harvesting, and the implementation of the system within the confines of completely automated storage, imaging and scoring systems. In addition, details on how the 3D microscope performs its' 360° degree rotation and allows the user to view the experiment from all angles without having to move it will also be presented. The uniqueness of the microscope system is evident in the 3D movies the user can generate in real time. A variety of movies (with and without crystals) will be shown and analyzed as part of the presentation. With inspection powers from 10 to 7000x, along with a variety of options and adapters, including various 3D rotary head adapters, the system can handle examining large drops; to the small channels found within a microfluidic screening device. Various styles of lighting adapters are also available to help view the crystals and will also be discussed. The microscope has a fully automated stage and software which has been optimized for crystallographers, the details of which will be presented at the conference. Log onto *www.fmpharma.com* or *www.hirox-usa.com* to preview examples of the 3D movies prior to the ECM 2006 presentation.

m02.o03

A novel instrument for in-situ X-ray inspection of protein crystals in multi-well plates

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X-ray diffraction of putative protein crystals before they are harvested from multi-well plates prevents false identification of diffraction-quality crystals and discriminates from other objects such as amorphous precipitate. This has considerable benefits for the structural biologist practising X-ray crystallography in terms of reduced consumption of protein, time and resource savings, as well as improved scientific outcomes. A novel instrument is unveiled which allows automatic X-ray inspection of multi-well plates and which incorporates a new design of a compact high brilliance X-ray source. Several examples are described of experimental in-situ X-ray diffraction of real-life protein crystals in various stages of growth and of various sizes (as small as a few tens of microns) to illustrate the ability to process the X-ray data. Practical issues such as plate absorption and scattering are discussed and it is shown how these are overcome. Finally a discussion is presented of how the new instrument informs the methodology of crystallisation screening and optimisation as well as pre-synchrotron crystal screening and how this leads to increased productivity.