

I22 - A non-crystalline diffraction beamline for the physical and life sciences

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The UK has an active community that is at the forefront of developments in Non Crystalline Diffraction. Their interests encompass the fields of medicine, biology, environment and materials. They include: studies of supramolecular organization in biological systems, the structure and function of muscle filaments, corneal transparency, biological membranes, polymer processing, self assembly of mesoscopic metal particles, colloids, inorganic aggregates, liquid crystals and devices. The work is supported by the BBSRC, EPSRC, MRC and NERC. NCD is one of the truly synergistic interdisciplinary sectors within UK science and the wider international arena.

The requirements to meet the scientific and technological challenges of the next decade are for a high resolution, high brightness beamline which can only be provided by an undulator insertion device on a third generation synchrotron radiation light source.

The new beamline at Diamond, I22, will use an in vacuum undulator source to deliver a high photon flux into a focused 75 x 300 μm spot (approx. 1 x 1 μm with microfocusing) in the energy range 4-20keV. The experimental station, with associated linear and area detectors for static and time resolved measurements, will be capable of recording the scattered radiation from samples contained in purpose designed specialized environmental cells. Its modular arrangement will allow a choice between small angle scattering for large fibrous structures or microfocus illumination, each with a wide angle scattering option for materials studies.

I22 will play an important role in progressing our knowledge of macromolecular structure into function and into advancing the industrial development of biomaterials, biosensors and other devices. X-ray rheology experiments will improve the understanding of food gels and lead to the manufacture of better designed polymers and a more efficient production technology.