

Seeing the Heat

Preliminary Studies of Cryo-Crystallography Using Infrared Imaging

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As preparation for an extensive study imaging the cryo-cooling process of macromolecular crystals we have demonstrated the ability to thermally image solid objects and liquids at temperatures far below freezing. In the case of a large lysozyme crystal qualitative measurements show the cooling process to take about 0.2s with the cooling taking place in a wave from the face of the crystal nearest to the origin of the cryostream, to the point furthest away from the origin. Annealing of this lysozyme crystal, cooled under good cryo-protectant conditions, showed cold striations formed perpendicular to the cooling stream that became more pronounced after successive annealing. Cryo-cooling of a non-cryoprotected crystal of glucose isomerase displayed an S shaped cold front wave traveling across the sample. These results are preliminary but do show the power of infrared imaging as a new tool for fundamental and practical cryo-crystallography studies.