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A New Method for Flash Cooling Protein Crystals. M. Warkentin, V. Berejnov, R.E. Thorne, Physics Dept., Cornell Univ., Ithaca NY USA.

Despite the enormous success of cryocrystallographic techniques, there has been surprisingly little understanding of the fundamental mechanisms relevant to their successful application. We show that conventional flash cooling methods provide relatively slow cooling, and that cooling rate is largely unaffected when sample volumes are reduced below 0.1 mm^3 . We then describe a new flash cooling method that yields much larger cooling rates, especially for the very small crystals that can be mounted without excess liquid using microfabricated holders [1]. Cryoprotectant concentrations required to prevent formation of crystalline ice are dramatically reduced, simplifying cryoprotectant screening protocols and reducing the chances of crystal damage. Crystal mosaicities are reduced, increasing the quality of the structural information that is obtained. This work was funded by the National Institute of Health (R01 GM65981).

[1] R. E. Thorne et al., *J. Appl. Cryst.* 36 (2003) 1455-1460.