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Report:

We are elucidating the three-dimensional structure of the photosystem II (PSII) purified from the thermophilic cyanobacterium *Synechococcus elongatus*. Up to now we obtained electron density maps at relatively low resolutions, the most recent model determined at 3.8 Å (Zouni *et al.*, 2001).

X-ray experiments at our in-house generator showed that PSII crystals are sensitive to the freezing procedure. This could be due to the large size of the crystals resulting in a non-uniform freezing. Even crystals from the same crystallisation batch showed sometimes ice rings, sometimes not. Therefore we decided to freeze the crystals directly in the cryo stream at 100 K. This made on site crystallisation setups necessary. For the first trials the approved cryo protection condition was used and directly mounted crystals were compared with crystals frozen in liquid propane. The direct flash-freezing method had the following advantages:

- (1) better comparability of crystals from the same crystallisation batch
- (2) less occurrence of ice rings
- (3) higher resolution in comparison to crystals frozen in liquid propane

From a PSII crystal mounted directly in the cryo stream (typical dimensions are 0.4 x 0.8 x 0.1 mm³) we collected a data set of 70.2 % completeness. The data set was of reasonable quality to 3.6 Å resolution with $R_{\text{sym}}=0.16$ and $\langle I/\sigma(I) \rangle=11.1$ ($R_{\text{sym}}=0.54$ and $\langle I/\sigma(I) \rangle=2.6$, mosaicity 0.8°). Unfortunately the completeness is not high due to a lack of time, and we were not able to collect a low-resolution data set.

Reference

Zouni, A., Witt, H.-T., Kern, J., Fromme, P., Krauß, N., Saenger, W., Orth, P. (2001) Crystal structure of photosystem II from *Synechococcus elongatus* at 3.8 Å resolution. *Nature* **409**, 739-743.