

## **Nanosecond time-resolved crystallography: photolysis of carbonmonoxy myoglobin**

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Structural changes in carbonmonoxy myoglobin have been studied with nanosecond time resolution by Laue diffraction. The Fe-CO bond was broken with a 10 ns laser pulse and data sets were collected at different time delays between the laser flash and the x-ray pulse (4 ns, 1  $\mu$ s, 7.5  $\mu$ s, 50  $\mu$ s, 350  $\mu$ s and 1.9 ms) using the white beam on BL3 at the ESRF, Grenoble, France. The difference maps clearly show the release of the CO molecule, the displacement of the Fe and some further, minor rearrangements. The last time points confirm the reversibility of the reaction, which is of importance for the possibility of collecting redundant and accurate data. The results obtained establish the feasibility of acquiring data with sub-nanosecond exposure times and to thereby deduce structural information. The experiment was made possible by careful experimental design and newly developed equipment including a fast shutter, a low-noise detector, x-ray and optical monitoring systems and a high brilliance x-ray source. Similar experiments can now be performed at the ESRF, the limits being set by the possibility to synchronize the reaction under study on the relevant time scale.