Report for the short visit Ref 1346

In June 2006, Jérémie Léonard, from IPCMS Strasbourg, visited for 5 days the group of Prof. Majed Chergui at EPFL, Lausanne from the 26th to the 30th. The aim of the visit was to continue new series of ultrafast spectroscopic measruments on bacteriorhodopsin (bR) proteins and mutants, after the first results had been recorded the week before. Unexpected signals had been observed for the w86f mutant as mentionned in the report for the short visit Ref 1326.

The experimental set-up being optimized and the protein samples prepared the week before, Jérémie Léonard worked for five days at recording the transient absorption spectra of wild-type bR, w182f and w86f mutants. The pump wavelength was fixed at 550 nm, and the probe wavelength was successively set at 270nm, 280nm and 303 nm.

The transient absorption of the three samples hardly depend on the wavelength from 270nm to 280nm. A typical measurement is displayed in Figure 1. The most unexpected result here is that the amplitude of the transients are comparable for the three samples, whereas one would expect a significantly smaller amplitude in the case of W86F (see the report for the short visit Ref 1326). Figure 2 displays the same results after the curves have been normalised. For a given sample, the temporal behavior is perfectly reproducible as shown by the two measurements displayed for the w182f mutant (blue and green squares overlapp perfectly in Figure 2). In addition, the main differences between the 3 samples clearly appear in the different decay time constants.

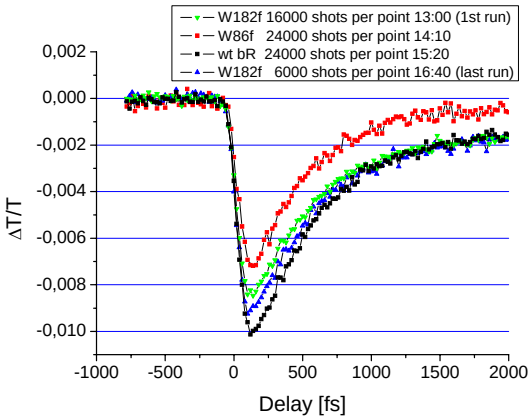

Figure 1

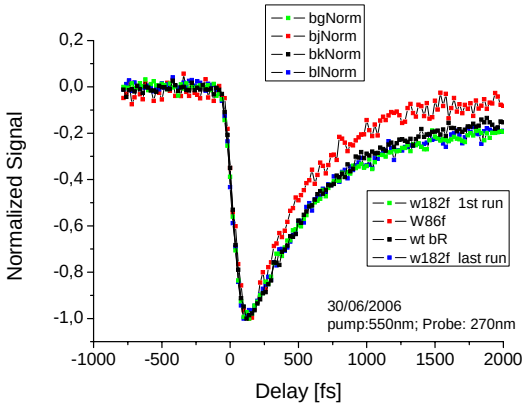

Figure 2

At 303 nm, the transients are weaker in intensity (more influence of the noise), and the W86F mutants is significantly different, as shown in Figure 3.

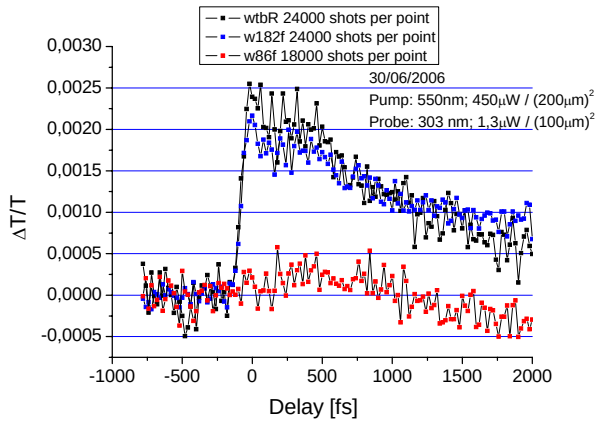

Figure 3

Intermediate wavelength (range 280nm-300nm) were not investigated, but should show different behavior.

One of the remaining open questions concerns the rise time of the transients in the range 270nm-280nm. To answer the quesrion, improved experimental time resolution is needed. This could probably be achieved by using a thinner flow cell, in order to reduce the thickness of water (solvent for the proteins) and reduce the effect of the group velocity mismatch in the solvent between the pump and probe pulses.

These results raise several questions, the answer to which requires more data acquisition both at different wavelenghts and with better time resolution. Further visits are planed for J. Leonard at EPFL.