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EXPERIMENTAL REPORT

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TITLE
Development of the technique for time resolved SANS-experiments on weakly scattering solution systems

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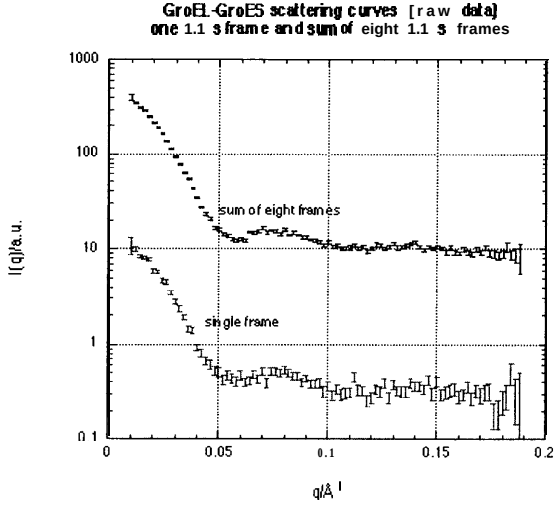
In the last proposal round, two days of beam-time on D22 were allocated to test time resolved Small Angle Neutron Scattering on weakly scattering systems like protein solutions and liposomes. We had planned to perform these experiments with a new electronics prototype version of a developed by the ILL. Because of some installation problems of this electronics, we could only start our experiments on the 1/10 at 22.20. As we were accorded some other time on the 2/10, we could use finally one day for our experiments.

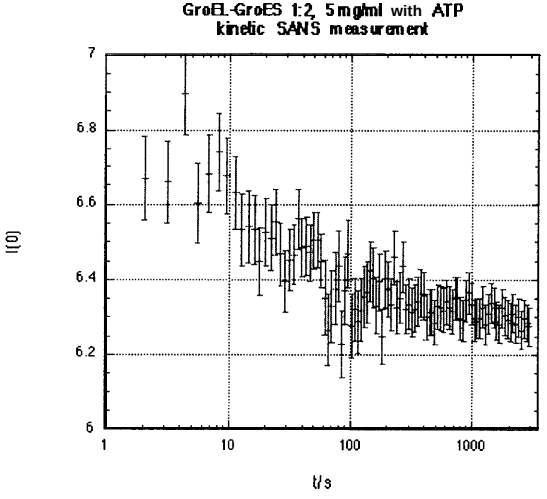
We studied kinetics of two systems:
- the formation of bullet (1: 1) and football (1:2) complexes of GroEL and GroES
- the development of the structure of liposomes after pH-jumps

After the test of the links between the control of our stopped-flow-apparatus and the D22 electronics, we performed kinetic experiments by mixing two solutions with different compounds. We started with time slices of one second, which increased exponentially up to three minutes. Even the slices of about one second allowed us to observe some basic structure information (figure 1).

In further experiments, we will be able to increase the count rate by about the factor three, as we restricted the count rate to avoid exceeding a maximum of 50000 counts per second required by the electronics prototype. In addition to this, we will be able to improve the data quality by the use of contrast variation.

A first look on the development of the zero intensity when mixing GroEL and GroES in a ratio of 1:2 shows surprisingly a decrease of the zero-angle scattering intensity I(0) particularly during the first 100 seconds (figure 2). This indicates a decrease of the complexes size.





As we have just started data treatment, are not yet able to offer an explication for this observation. During the next weeks, we will continue data treatment of these series. We hope to be able then to answer outstanding questions about chaperonins mechanism and about liposome structures.

acknowledgments:
We want to thank the ILL electronician team for their remarkable efforts in the development and installation of the new experimental facilities.