ESRF	**Experiment title:** X-ray photon correlation spectroscopy study of structural fluctuations in a microemulsion undergoing a percolation transition	**Experiment number:** SC 301
Beamline:	**Date of experiment:** from: 30-4-97 to: 06-5-97	**Date of report:** 20-6-97
Shifts:	**Local contact(s):** Abernathy, Douglas	*Received at ESRF:* 4 JUIL. 1997

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Report:

The experiments involved the measurements of the time-correlation function of the fluctuations in the intensity of X-ray scattering (XPCS) from the ternary microemulsion AOT-hydrocarbon-Water. Three hydrocarbon solvents were used: hexane, iso-octane and decane. The experiments were also carried out as a function of both the water concentration which determines the size of the microemulsion droplets and the AOT which determines the concentration of the droplets in the oil phase. The macroscopic properties of the microemulsions depend strongly on the nature of the oil phase. In addition to this, we also prepared microemulsions containing the hydrophilic polysaccharide gelatin, which is thought to act as a string joining different microemulsion droplets and restricting their translational diffusion in the oil phase.

The first, and longest, phase of the experiment involved a scan of the behaviour of the fluctuations in the X-ray scattering across the phase diagrams of the microemulsion in order to find the most favourable conditions for obtaining structural information. In particular we attempted to find the conditions under which the structural fluctuations were optimal for monitoring with the XPCS technique. This phase took over 4 days of the experiments.

The last three days were taken up with detailed measurements on the samples which yielded the most promising results in the perliminary scan. Each measurment was repeated at least four times on different preparations.

Although we were able to see the desired effects on some samples, the measurements turned not to be reproducible. We have still not been able to come up with an explanation. The results appear suggest that the structural fluctuations in the microemulsions are significantly faster than we anticipated and were not slowed down by the addition of gelatin. We are now investigating ways of slowing down the system dynamics, while preserving the percolation behaviour.