Conclusions

The thesis introduced two techniques, solvent relaxation that rises from the very basic understanding of photophysics and the fluorescence correlation spectroscopy that at the first sight uses the phenomena of fluorescence in order to merely visualize the studied system. Both the methods, however, give information on molecular dynamics. The relaxation "sees" kinetics of the solvent rearrangement, whereas FCS visualizes the diffusion.

Relaxation of the solvent seems to be a very useful tool in polymer science since it turns out to be sensitive to the presence of water molecules and their mobility in the micellar shell. The changes in microorganization of the shell, i.e., in water content and in hydration of polymer chains, are hardly accessible by other methods.

FCS is a complementary technique to the scattering methods, however, light scattering approach is already well established, whereas FCS results depend tremendously on the photophysics of the chosen dye and also on its location. The major advantage is that FCS is not much affected by big, strongly scattering particles (for instance aggregates) and that gives number-weighted averages of molecular mass and hydrodynamic radii. FCS, furthermore, works in lower concentration range and even if the refractive index increment is insufficient for scattering techniques. From the opposite point of view, polymer micelles are simple model systems that can be well used for testing of the method.

Whereas FCS measurements of micellar systems in three dimensions (i.e. in the solution) do not bring any unexpected breakthrough compared to the standard techniques, the method being applied in two-dimensions, i.e. in the membranes, moreover, in the living systems, cannot be replaced by any other method.

The utilization of FCS for the exploration of membranes in living cells, which is discussed in the last chapter, is doubtlessly a unique approach to learn about membrane microheterogeneities that are beyond the resolution of confocal microscopy.