	Experiment title: High frequency dynamics in polymer gels	**Experiment number:** SC-841
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Report:

We have performed inelastic x-ray scattering experiments on the physical gel system propylene carbonate (PC)/poly(methyl methacrylate) (PMMA). This type of system is intrinsically heterogenous on a mesoscopic length scale with the solvent dynamics (here PC) generally much faster than and often decoupled from the polymer matrix (here PMMA). In physical gel systems, characteristic length scales, e. g. polymer inter chain distances, can be tuned by varying the polymer content. The aim of the present experiment is to investigate how the collective high frequency excitations are influenced by this length scale.

We have investigate four samples ranging from pure PC to a gel containing 50% PMMA by weight (0, 10, 30 and 50% PMMA). The samples were prepared by mixing the appropriate amounts of PC and PMMA and then annealing around 340 K in order to obtain macroscopically homogenous samples. In the IXS experiment a sapphire cell with diamond windows was used for pure PC and the 10% sample, whereas an aluminium cell with oriented sapphire windows was used for the 30% and 50% samples. IXS experiments were performed at T=167 K, which is close to the bulk glass transition temperature of PC (T_g=160 K). For each sample three different spectrometer settings were used covering a Q-range from 1-15 nm^{-1} and for pure PC and the 50% gel also a fourth high Q-setting for the region 20-32 nm^{-1} (energy range ±30 meV). The energy range in the experiment was E=±25 meV. The integration time was 60s per energy point and for each sample several energy scans

were summed in order to increase the statistics. For each of the sample cells an empty cell measurement was performed in order to estimate the pure cell contribution and the background was estimated from a empty beam measurement. A static structure factor, S(Q), for each sample was recorded as well.

Figure 1 shows experimental data for pure PC and the 50% gel. At low Q there are inelastic modes dispersing with increasing Q. By mere inspection of the data we can also note that there is an increased elastic intensity with increasing polymer content. The inelastic signal will be extracted form the data using convolution peak fitting routines and the data will also be corrected for background and empty cell signal.

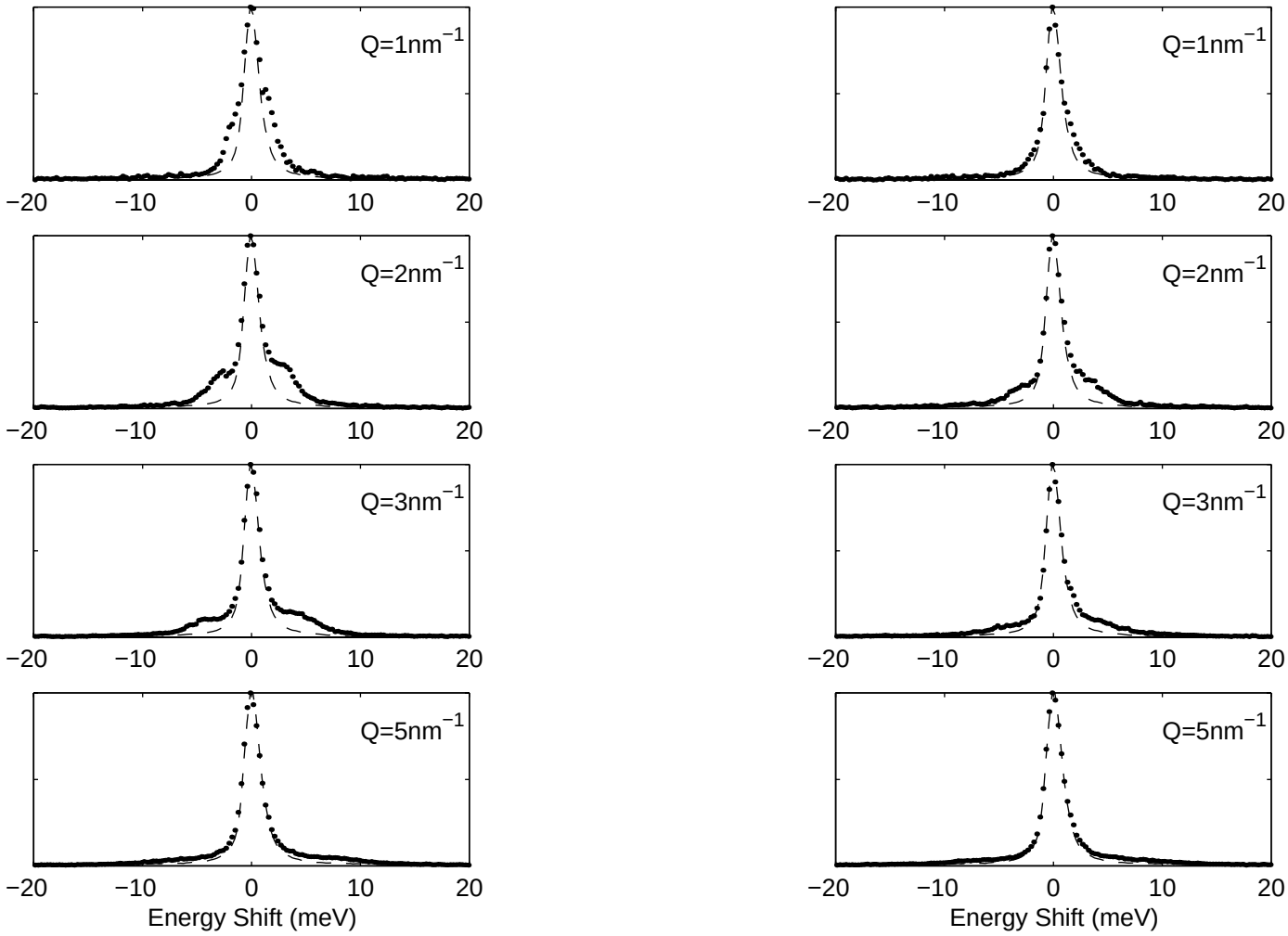

Figure 1 Left: Experimental data for PC. Right: Experimental data for 50%PC/50%PMMA. Symbols show the experimental data and dashed line the experimental resolution function.