Supplementary Information for publication with the title "Organic-Inorganic Composites from Nanoscopic Magnesium Fluoride in Acrylate Matrices"

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Raman spectra from samples are recorded to determine the degree of polymerisation from the intensity of the C=C double bond at 1640 cm^{-1} in relation to the other bands of HEMA. As seen from figure 1s, no signal of the C=C bond is recorded, while the other bands remain in intensity. Thus, the degree of polymerisation is believed to be greater than 95 %. Introduction of magnesium fluoride shows to have no influence on the polymerisation.

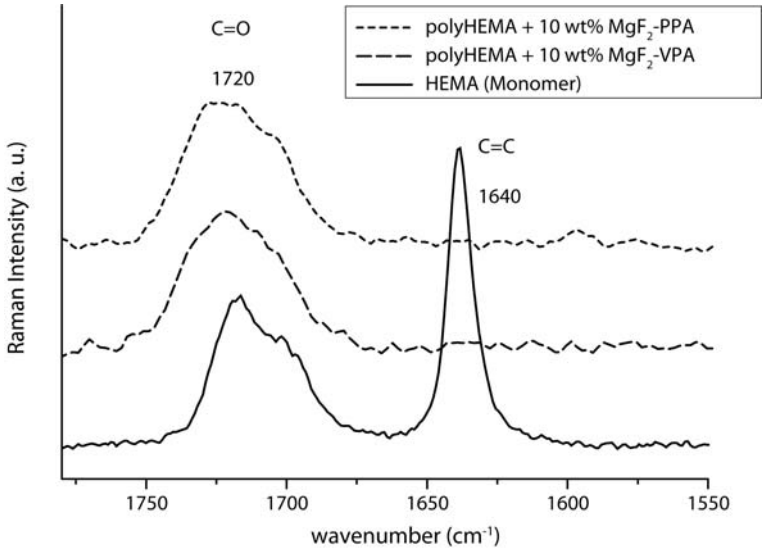

Fig. 1s Raman spectra of composites consisting of PPA and VPA modified magnesium fluoride nanoparticles in polyHEMA.

The SAXS patterns of ground composites prepared from non-stabilised, PPA and VPA-stabilised magnesium fluoride sol particles are given in figure 2s. Both curves from the PPA and VPA sample, resemble small particles with a size of approximately 4 nm. The sample, made from the pure MgF_2 sol exhibits a strong increase in scattering intensity at low q values. Since the equipment available does not allow measurements at even smaller angles, fitting and extrapolation of the experimental data to extract particle sizes is not possible. However, by comparison with other scattering curves, we expect a particle size of several ten nanometers or larger.

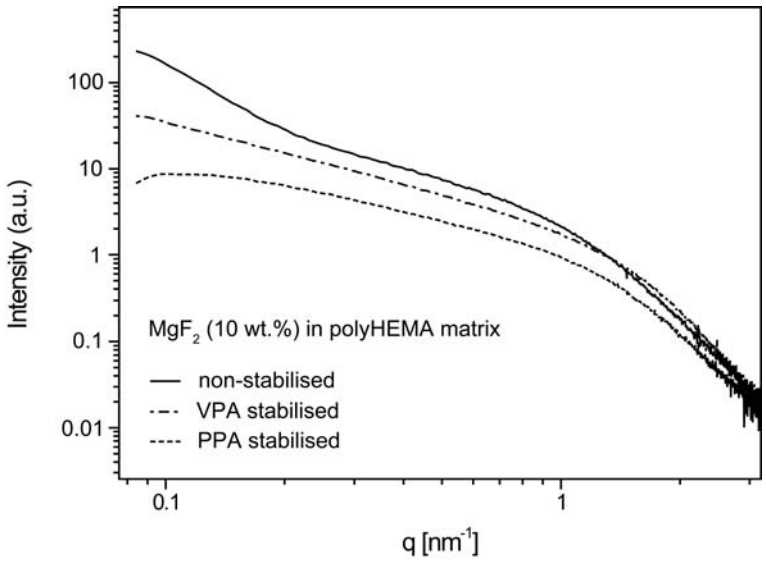

Fig. 2s SAXS patterns of pure methanolic magnesium fluoride sol after 6 days compared to a phenylphosphonic acid stabilized sol.

Visualisation of magnesium fluoride nanoparticles in the polymer is difficult because of the small particle dimensions and very little contrast of magnesium and fluorine in comparison to the polymer matrix. Figure 3s shows a TEM image of an ultramicrotome cut (~100nm thickness) of a nanocomposite with 20 wt.% magnesium fluoride. Two particles are identified by their lattice plane distances (200) as crystalline MgF_2. As an optical guideline in order to visualise the particle-polymer boundaries, the particles are surrounded by a black line. During these microscopic experiments, neither large agglomerates nor phase separation between inorganic particles and polymer are observed. Thus, TEM investigation supports the integral measurement of particle size distribution inside the composite by SAXS.

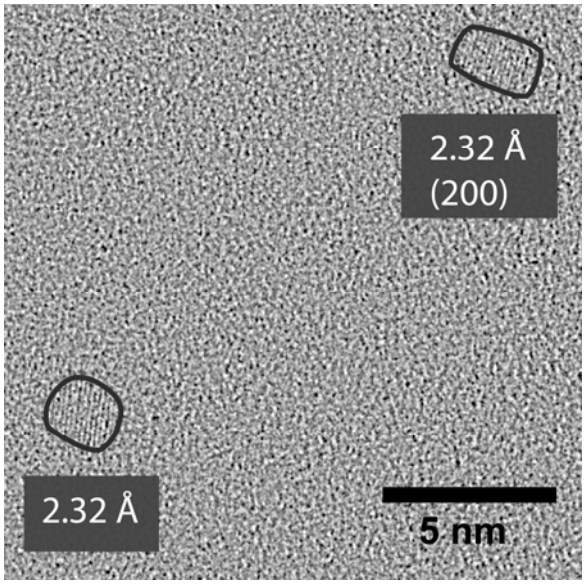

Fig. 3s TEM image of an ultramicrotome cut of polyHEMA based nanocomposite with 20wt% MgF_2.