



	<b>Experiment title:</b> Structural investigation on molten eutectic Cu-Ge using anomalous X-ray scattering	<b>Experiment number:</b> HS-1183
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### Report:

The aim of the experiment was to get different weighted total scattering functions for the molten eutectic alloy  $\text{Cu}_{64}\text{Ge}_{36}$  (which subsequently allow the determination of partial structural functions) using anomalous scattering. Wavelengths of 1.391 Å and 1.440 Å as well as 1.122 Å and 1.148 Å were used, which correspond to energies close to these of the Cu-K and Ge-K absorption edge, respectively.

During the experiment the sample was hold in graphite crucibles placed in a commercial high-temperature chamber which was filled with helium after evacuation. The scattering intensity from the free sample surface was measured in reflexion geometry at temperatures of 650, 800 and 1000°C at every wavelength mentioned above. A PIN-diode was used as detector which allowed to separate the elastic scattering from the fluorescence (the latter became dominant especially at the shorter wavelengths).

Fig. 1 shows the Faber-Ziman structure factors  $S(Q)$  for a temperature of 650°C which were finally calculated from the measured intensities by

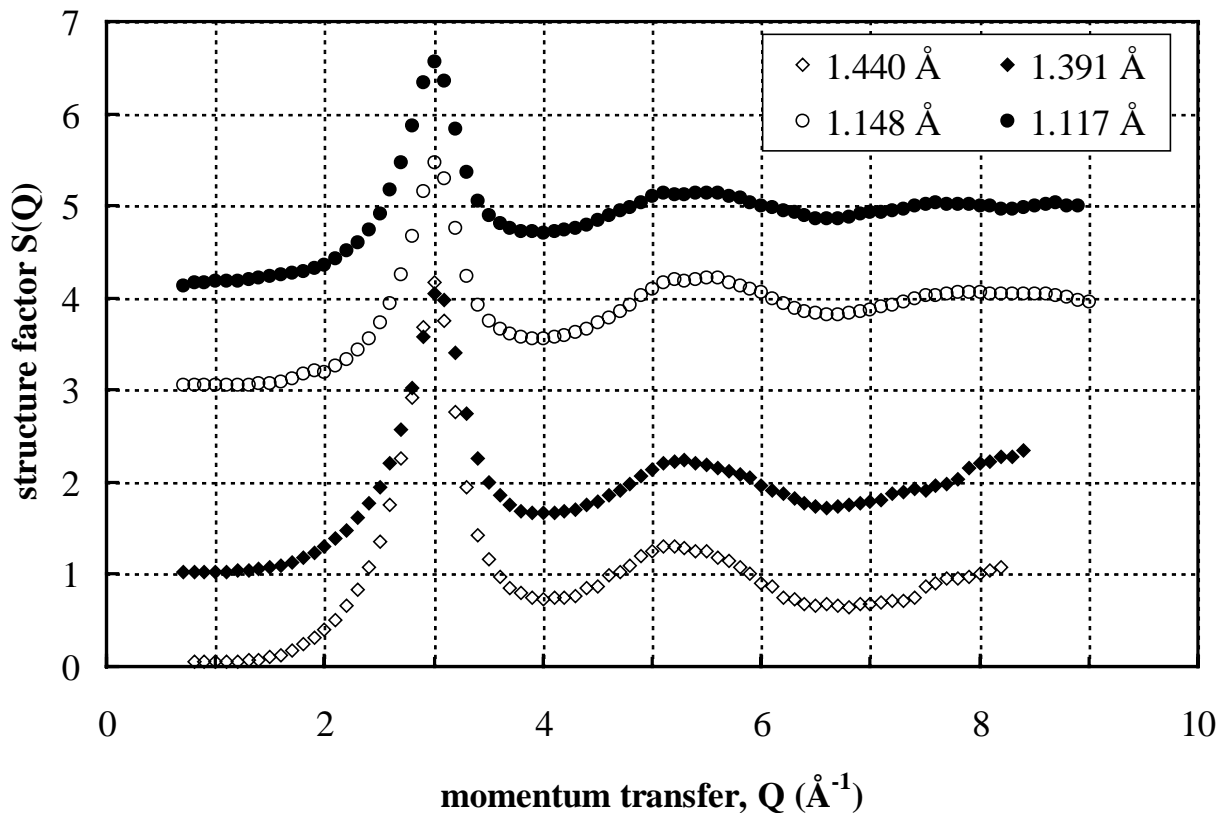
$$S(Q) = \frac{I_A^{coh}(Q) - c_1 c_2 (f_1 - f_2)^2}{(c_1 f_1 + c_2 f_2)^2}$$

$c_i, f_i$  - concentration and scattering factor of atomic species  $i$

$I_A^{coh}$  - coherent scattering intensity per atom

In their general shape they are in reasonable agreement with structure factors resulting from conventional X-ray scattering experiments.

It must be stated, however, that the structure factors corresponding to slightly different energies near the absorption edge under consideration and even these due to different absorption edges do not show a distinct difference. Consequently, the calculation of partial structure functions became difficult and did not lead to satisfactory curves.



**Figure 1** Structure factor of molten  $Cu_{64}Ge_{36}$  at a temperature of  $650^{\circ}C$  for different wavelengths