

**Experiment title:****Short and medium range order in liquid Ga-In-Sn alloys****Experiment****number:**

SC-4960

Beamline: ID-15A	Date of experiment: from: 10.11.2020 to: 13.11.2020	Date of report: 23.02.2021
Shifts: 9	Local contact(s): Gavin VAUGHAN	<i>Received at ESRF:</i>

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Total scattering x-ray diffraction patterns were recorded in December 2020 on the ID-15A beamline for several samples of room temperature liquid alloys in the gallium-indium and the gallium-indium-tin system. The binary samples with compositions Ga, Ga_{85.8}In_{14.2}, Ga₇₀In₃₀, Ga₅₀In₅₀, Ga₂₀In₈₀, and the ternary samples with compositions Ga_{75.4}In_{14.4}Sn_{9.2}, and the Ga-rich compositions Ga_{78.9}In_{17.8}Sn_{3.3}, Ga_{70.8}In_{13.8}Sn_{15.4}, Ga_{82.1}In_{11.2}Sn_{6.7}, Ga_{68.8}In_{20.8}Sn_{10.4}, Ga_{56.6}In_{29.6}Sn_{13.8} and Ga_{61.4}In_{9.5}Sn_{29.1} had been prepared and filled in glass capillaries and data were recorded as a function of temperature and composition. The spectra were recorded at an incident beam energy of 100 keV using a Dectris-Pilatus area detector and the wavelength was calibrated using a Cr₂O₃ standard.

The data recorded on these samples are of high quality and will help to characterize the local structure in the room-temperature liquid alloys. The recorded data show that the samples were optimally prepared and well suited for the recording of high quality data.

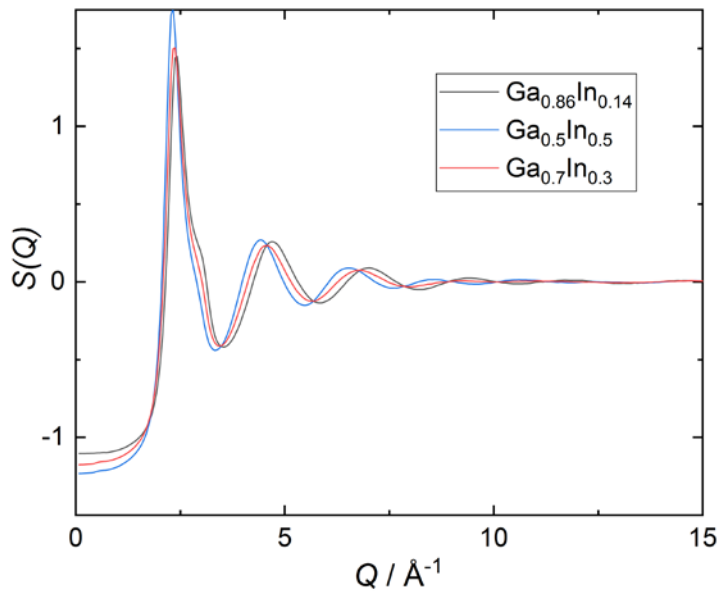


Figure 1. Total structure factor for several liquid alloys after data correction and normalization.

The obtained diffraction patterns will be used for analysis by two methods. After correction for absorption, multiple and Compton scattering and normalization, the individual data sets will be analyzed to determine the shortest interatomic distances and average coordination numbers in the room-temperature liquid alloys. Secondly, we will use the a reverse monte carlo approach to determine partial contributions to the total pair distribution function, where we use our previously recorded extended x-ray absorption fine structure data for the Ga-, In-, and Sn-K edges to extract contributions of individual species to the total coordination number. The data will be published in probably two independent peer-reviewed articles, discussing the binary gallium-indium and the ternary gallium-indium-tin samples. The support of Dr. Gavin Vaughan for the mail-in experiments was crucial for the success of this beamtime.