

Polymorphism of Ge in the Undercooled Liquid Region?

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An extensive experimental investigation of elemental Ge in a wide pressure/temperature (P,T) range has been undertaken at the ESRF BM29 x-ray absorption spectroscopy beamline using state-of-the-art setups for extreme conditions [1].

These experiments involved the acquisition of low-noise x-ray absorption spectra at the Ge K-edge at fixed thermodynamic conditions (P,T), for an accurate determination of the short range structural properties, and sufficiently high-resolution for an insight into the nature of the unoccupied electronic states. In addition, x-ray absorption temperature scans at a fixed pressure loads were collected to reveal melting and nucleation of the stable crystalline phases. These data have provided valuable information on the transformations of the structural and electronic properties of the liquid Ge phase, as a function of P and T, both in the equilibrium and non equilibrium undercooled liquid state.

The issue of the possible existence of a liquid-liquid phase transition line ending in a critical point in the undercooled liquid region of the Ge phase diagram is addressed on the basis of the experimental evidence. These findings are discussed in comparison with other published results including recent ones on the transformations of amorphous germanium under pressure [2].

References

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[2] - E. Principi, A. Di Cicco, F. Decremps, A. Polian, S. De Panfilis, and A. Filipponi, "Polymorphic transition of germanium under pressure.", *Phys. Rev. B* **69**, 2012XX(R) (2004).