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# The Martensitic Transformation in In-Tl Alloys Revisited

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The traditional, "text-book" view [1] for the martensitic transformation in In-x at%Tl alloys, for 15.5 ≤ x ≤ 30.5, has been via a double shear such as: (101)[$\bar{1}$01]; (011)[0$\bar{1}$1], on the basis of optical -microscopy observations [2] and measurements of the (c11 − c12)/2 elastic constant [3]. However, this model was called into question following measurements of the low-⊠, [⊠⊠0][⊠⊠̄0] phonons, initially on the HB3 triple-axis spectrometer at the Oak Ridge National Laboratory [4], on the H7 spectrometer at Brookhaven National Laboratory [5] and more recently, at the Australian Centre for Neutron Scattering (ACNS), via Proposal DB6030, on the Sika cold-triple-axis spectrometer at the OPAL Research Reactor [6]. An alternative model for the formation of coherent nuclei and growth along conjugate {111} planes was once proposed by Geisler [7]. This model is consistent with some electron diffraction diffuse scattering data [8] as well as yielding identical x-ray pole figure results as those for the double-shear mechanism [7], where appropriate nuclei could be generated by ⟨111⟩⟨11$\bar{2}$⟩ atomic displacements. To test such an idea we have measured the [⊠⊠⊠]T phonon branch as a function of temperature, for a good quality, In-Tl crystal through ACNS proposal P7049, also on the Sika spectrometer. In addition, we are undertaking resonant ultrasonic spectroscopy (RUS) and transient grating spectroscopy (TGS) measurements on small crystals of In-Tl, which we have shown to exhibit the martensitic transformation, through a recent experiment on the Koala Neutron Laue Diffractometer at OPAL via ACNS proposal DB17489. The results of these various experiments will be presented and discussed, in relation to the traditional view for the transformation in In-Tl alloys.

References

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## Topics

Magnetism and Condensed Matter

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