

Can a crystal change its spots?:

A compositional microstructure investigation of $\text{Ni}_{50}\text{Mn}_{28.5}\text{Ga}_{21.5}$ crystals grown at different speeds.

A series of magnetic shape memory alloy crystals ($\text{Ni}_{50}\text{Mn}_{28.5}\text{Ga}_{21.5}$) were grown by floating-zone technique at different speeds (2 – 80 mm/hr).

They behave differently, and we are certain it is because at some growth speed the way they crystallise changes and we end up with a destabilised growth interface. This becomes clearly seen in compositional mapping of the surface of some crystal sections (Figure below).

This project would **quantitatively map** the composition variation on the surface of the crystals using our new (literally, we are still peeling the plastic off its display panels) **X-ray fluorescence spectrometer**.

We can then see, whether high-temperature annealing of the samples removes these cellular compositional-segregation structures – returning a good crystal.

The project will involve mounting the samples and programming the measurements on ~20 samples. The resulting composition variation maps then need to be plotted, and the composition variation needs to be quantitatively and qualitatively analysed. With other measurements, we hope to publish this as part of a scientific article during this year.

Qualitative composition mapping Mn- content

