ESRF	**Experiment title:** ***Single crystalline Heusler Alloy Ni-Mn-In-Co – correlation of magnetism and structural transition***	**Experiment number**: HC-722
Beamline: ID12	**Date of experiment**: from: 11.07.2013 to: 16.07.2013	**Date of report**:
Shifts: 18	**Local contact(s)**: Fabrice Wilhelm	*Received at ESRF:*

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Report:

The aim of the experiment was to investigate the nature of anisotropic magnetic behavior and its correlation with the local structure in Ni-Mn-In-Co single crystal Heusler alloy using XLD and XMCD. In order to do that a a single crystal $Ni_{45}Mn_{37}In_{13}Co_5$ of about 80µm was prepared on a substrate. However, during the beamtime problems with the focussing optics prevented successful measurements of this crystallite. Therefore, we decided to measure a powder sample to study the element-specific magnetic properties by XMCD. We recorded XMCD spectra for the Ni, Mn and Co K-edges for two temperatures martensite and the austenite state.

In combination with magnetization measurements and ferromagnetic resonance measurements we were able to study the magnetic interactions in a wide temperature range. This study is described in a manuscript with the titlle “Magnetic ordering in magnetic shape memory alloy Ni-Mn-In-Co” and has been submitted for publication.

The abstract of the manuscript is the following:

Structural and magnetic properties across the martensite-austenite phase transitions in the shape memory alloy Ni-Mn-In-Co are studied using complementary experimental techniques: ferromagnetic resonance, macroscopic magnetization measurements and x-ray magnetic circular dichroism in the temperature range from 5 K to 450 K. Ferromagnetic resonance experiments show coexisting antiferromagnetic and ferromagnetic correlations for the martensite phase and ferromagnetic and paramagnetic correlations in the austenite phase. Magnetization measurements reveal spin glass like behavior for $T < 30$ K and Ni and Co K-edge x-ray magnetic circular dichroism measurements confirm an assignment of an FMR line purely to Ni and Co for a wide temperature range from 125 K to 225 K. Hence, combined ferromagnetic resonance and x-ray magnetic circular dichroism analysis allows to address resonances to individual elemental species in the alloy.