ESRF	**Experiment title:** Atomic diffusion in intermetallic alloys measured by XPCS	**Experiment number:** HE-2845
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Report:

The results from our successful experiment on $Cu_{90}Au_{10}$ have been published under "M. Leitner, B. Sepiol, L. M. Stadler, B. Pfau, and G. Vogl, Atomic diffusion studied with coherent X-rays, *Nature Mat.* **8**, 717–720 (2009)" accompanied by the News & Views-feature "G.B. Stephenson, A. Robert, and G. Grübel, X-Ray spectroscopy: Revealing the atomic dance, *Nature Mat.* **8**, 702–703 (2009)". We enclose the abstract of this publication:

Knowledge of atomic diffusion is a fundamental issue in synthesis and stability of materials. Direct studies of the elementary diffusion event, i.e. how the individual atoms "jump", are scarce, as the available techniques are limited to selected systems[1]. Here we show how by monitoring the spatial and temporal variations of the scattered coherent X-ray intensity the diffusion of single atoms can be studied. This is demonstrated for the intermetallic alloy $Cu_{90}Au_{10}$. By measuring along several directions in reciprocal space we can elucidate the dynamical behaviour of single atoms as a function of their neighbourhood. This method, usually referred to as X-ray photon correlation spectroscopy (XPCS)[2–5], does not rely on specific atomic species or isotopes and can thus be applied to almost any system. Given the advent of the next-generation X-ray sources we envision XPCS to become the main method for quantitatively understanding diffusion on the atomic scale.

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