ESRF	**Experiment title:** Recrystallisation of amorphous $Cu_{50}Ti_{50}$ to the nanocrystalline state	**Experiment number:** HS3
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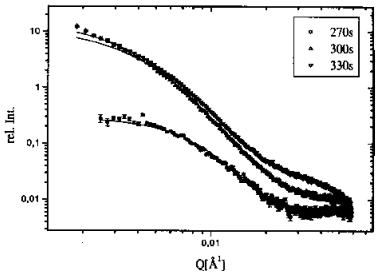
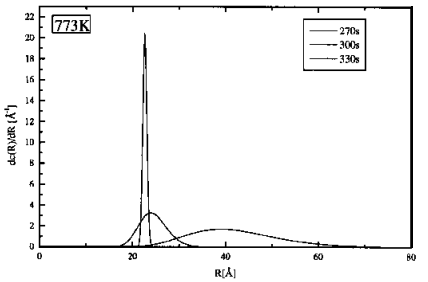
Report:

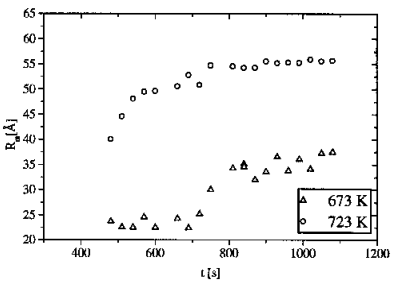
Nanocrystalline Materials consist of crystallites of diameter in the range from typical 10 nm to 50 nm. Due to the large fraction of atoms located in grain-boundary-regions, they show interesting properties different from polycrystalline materials. Conventional preparation methods reduce the crystal-size of polycristalline educts (ball-milling) or create small clusters of atomar educts (noble-gas-condensation). A different route is the recrystallisation of glassy metals, induced by heating. The small density inhomogenities of nanoscale crystallites in an amorphous matrix cause small angle scattering.
Polycrystalline CuTi was prepared by induction melting from the elements. This polycristalline educt was transformed to the amorphous state via melt-spinning. The ribbons obtained (30μ thickness) were heated in a Linkam-furnace as quick as possible up to definite temperatures in the range from 623K to 873K. In intervalls of 30s we analysed the SAXS-signal during crystallisation for approximately one hour. The resulting data were corrected for background (background and scattering resulting from the as-prepared state) and detector efficiency.
Crystallisation caused significant effect in small angle scattering. The data in the following figure show the drastical change at 773K within 90 s. The data could be described by a model assuming crystalline spheres with a lognormal-distribution of radii.



The resulting radii-distribution is shown in the next figure.



The effect of temperature during crystallisation can be seen in the following figure, where the median of radii is plotted versus time.



Our aim is to determine activation energy for crystallisation. Today, the interpretation of data is not completely finished. We could show the possibility to observe the phase transition form amorphous to nanocrystalline state in real-time using SAXS.