

Strength and deformation of precious high entropy alloys

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HEA branch

The present proposal aims at a sound description of the structure-property relationships in AuCuNiPdPt. The results will be used to separate the material behaviour of the HEAs cleanly from that of single phase conventional alloys and to identify which issues are special for HEAs leading to their peculiar properties. This would help engineers to understand, control and tune the properties of HEAs more efficiently.

Motivation and aims

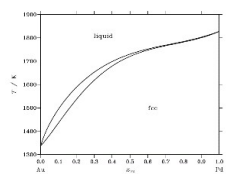
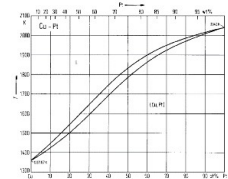
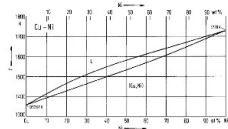
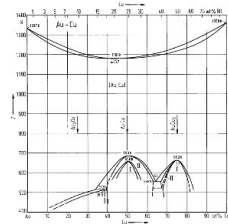
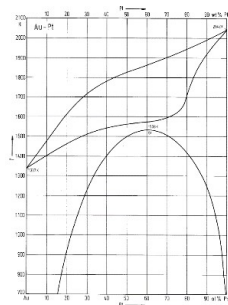
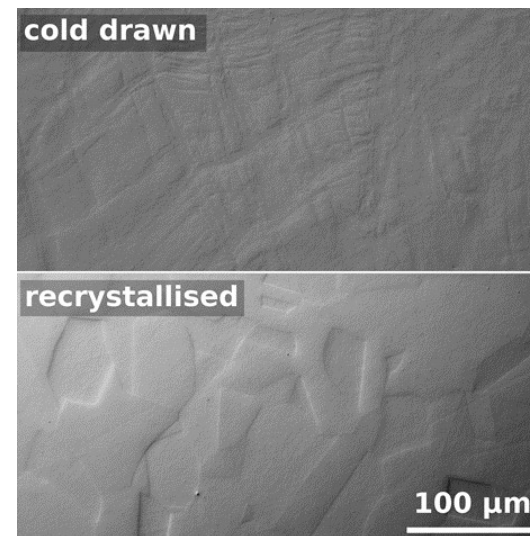
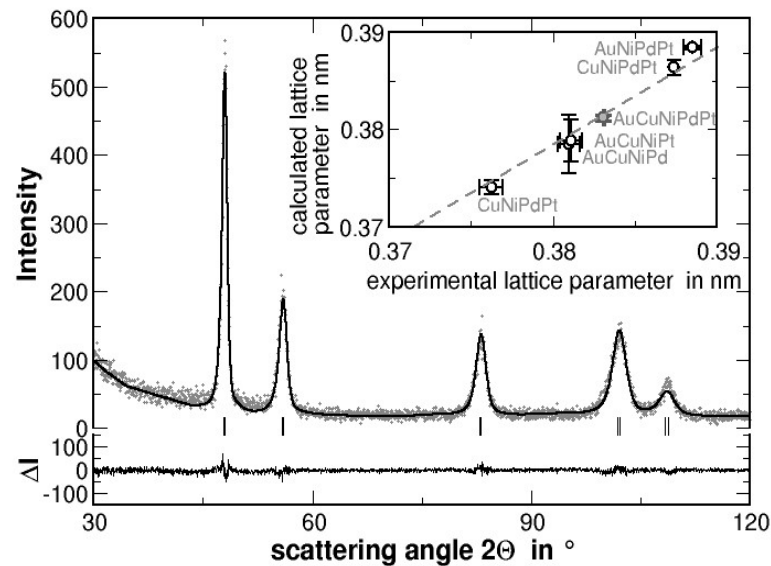
Investigation of single phase high entropy alloys

- cleanly separate the material behaviour of HEAs from that of single phase conventional alloys
- identify which issues are special for HEAs leading to their peculiar properties
- influence of single or multiple element concentration on strength
 - no comprehensive model for solid solution strengthening in HEAs
- deformation mechanisms
- the gained knowledge can be transferred and applied to CCAs
- however, a basic understanding of the underlying effects on materials properties can be gained with higher soundness from single phase HEAs

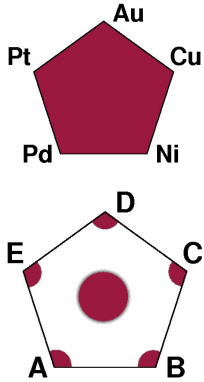
Preliminary work

The Au-Cu-Ni-Pd-Pt system

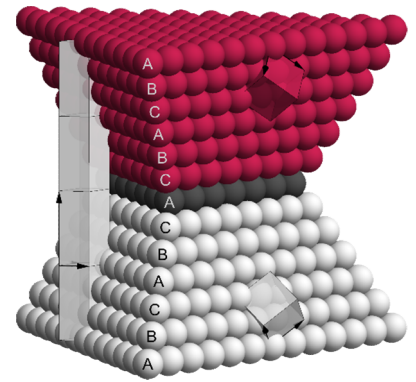
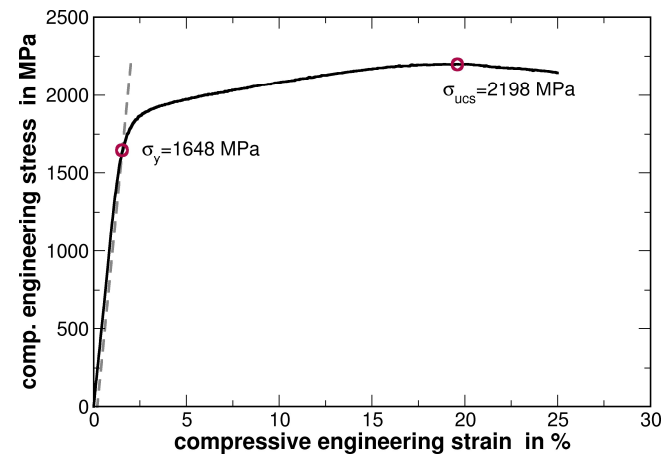
- discovery of a new single phase HEA
- sample preparation by arc-melting and / or mould casting
- homogeneous solid solution in the whole (?) concentration range
- cold working by swaging and rolling, ...



Aims and work programme



- sample preparation
of face centred cubic multi-component homogeneous solid solutions:
equimolar AuCuNiPdPt and non-equimolar alloys in this system
- phase stability
- deformation mechanisms
including the conditions under which twinning occurs
- strengthening mechanisms
solid solution strengthening,
strengthening by segregations,
grain-boundary strengthening
- outlook for the 2nd period:
creep, ...



Networking

