

Short overview on high entropy and complex concentrated alloys.

Yannick Champion

Université Grenoble Alpes – G-INP - CNRS - Laboratoire SIMaP, Grenoble.

The story has begun in 2004 simultaneously in Oxford and Taiwan, with suggestion that multielementary and equiatomic metallic solid solutions may produce novel properties. At the starting point, the group of Cantor in the UK proposed to study the unexplored central part of multielementary phase diagrams, whilst the group of Yeh in Taiwan was working on the possibility from thermodynamics considerations to avoid intermetallics formation and low fracture resistance in solid solutions. Eventually the two approaches have been converging to the same concept of high entropy alloy. Fashion or real perspective, whatever these alloys constitute a novel metallic medium with no reference metal, as one are used to (Fe-based, Al-Based Ti-based ... alloys). These alloys are more than simple random distribution of four or five metallic elements on an fcc or bcc Bravais lattice. They are characterized by local lattice distortions, which affect the simple ideal configurational entropy. In this very short overview, I shall introduce the novel metallurgical approach of these alloys, the so-called four core effects and origin of possible novel properties. I shall make a focus on various TiVNbXY (with X,Y =Cr, Ta, Ni) alloys for hydrogen storage with some insight of the thermodynamics.