Chih Ming Lin, Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C2-017

4th International Conference on

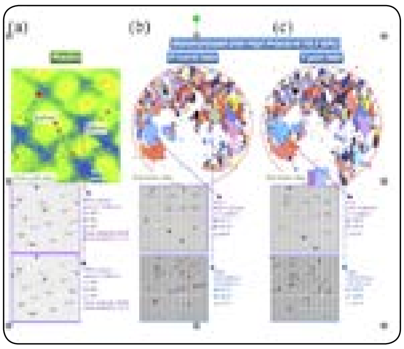
Condensed Matter and Materials Physics

August 16-17, 2018 | London, UK

Synthesis of a stable HCP-FCC mixture phase of the high-entropy superalloys $Al_{0.15}Co_{0.18}Cr_{0.12}Fe_{0.11}Ni_{0.36}Ti_{0.08}$ at high pressure

Chih Ming Lin
National Tsing Hua University, Taiwan

High-entropy superalloys (HESA), $Al_{0.15}Co_{0.18}Cr_{0.12}Fe_{0.11}Ni_{0.36}Ti_{0.08}$, non-equimolar solid solutions of six elements, represent a new strategy for the design of materials with properties superior to those of conventional alloys. However, their phase space remains constrained, with transition metal high-entropy alloys containing FCC γ matrix with localized dispersion of L12 γ' particles. Here, we report the high-pressure synthesis of a stable HCP-FCC mixture phase of the prototypical high-entropy superalloys $Al_{0.15}Co_{0.18}Cr_{0.12}Fe_{0.11}Ni_{0.36}Ti_{0.08}$. This martensitic transformation begins at 0.55 GPa and is attributed to suppression of the local magnetic moments, destabilizing the initial FCC γ structure. However, the behaviour of $Al_{0.15}Co_{0.18}Cr_{0.12}Fe_{0.11}Ni_{0.36}Ti_{0.08}$ is unique in that the HCP phase is retained following decompression to ambient pressure, yielding a stable HCP-FCC mixture phase. This demonstrates a means of tuning the structures and properties of high-entropy superalloys in a manner not achievable by conventional processing techniques.



Recent Publications:

1. Lin CM et al. (2014) Pressure-induced structural phase transition in bulk $Zn_{0.98}Mn_{0.02}O$ by angular dispersive X-ray diffraction. J. Alloys and Compounds. 604C:298-303. Doi:10.1016/j.jaillcom.2014.03.055.
2. Lin C M et al. (2015) Pressure-Induced Phase Transitions in InAs studied by angular-dispersive x-ray diffraction and roman spectroscopy. Science of Advanced Materials. 7:1039-1044. Doi:10.1166/sam.2015.2174.
3. Huang J M et al. (2015) *In situ* Al-doped ZnO films by atomic layer deposition with an interrupted flow. Material Chemistry and Physics. 165:245-252. Doi:10.1016/j.matchemphys.2015.09.024.
4. Lin K L et al. (2016) Structural properties of pressure-induced structural phase transition of Si-doped GaAs by angular dispersive X-ray diffraction. Appl. Phys. A. 122(2):117. Doi:10.1007/s00339-016-9660-3.
5. Huang J M et al. (2016) Enhanced electrical properties and field emission characteristics of AZO/ZnO-nanowire core–shell structures. Phys. Chem. Chem. Phys. 18(22):15251-15259. Doi: 10.1038/s41598-018-19679-2.

Biography

Chih Ming Lin has his expertise in evaluation and passion in improving the health and wellbeing. Her open and contextual evaluation model based on responsive constructivists creates new pathways for improving healthcare. His research interest include: the physical properties of high-entropy alloys (HEAs) and Topological insulators (TIs) materials under high pressure and the process of synthesis of high-entropy alloys (HEAs) and Topological insulators (TIs) materials.

cm_lin@phys.nthu.edu.tw