

# Author's Accepted Manuscript

From diluted solid solutions to high entropy alloys:  
On the evolution of properties with composition of  
multi-components alloys

Mathilde Laurent-Brocq, Loïc Perrière, Rémy  
Pirès, Frédéric Prima, Philippe Vermaut, Yannick  
Champion



PII: S0921-5093(17)30551-8  
DOI: <http://dx.doi.org/10.1016/j.msea.2017.04.079>  
Reference: MSA34980

To appear in: *Materials Science & Engineering A*

Received date: 14 March 2017  
Revised date: 19 April 2017  
Accepted date: 20 April 2017

Cite this article as: Mathilde Laurent-Brocq, Loïc Perrière, Rémy Pirès, Frédéric Prima, Philippe Vermaut and Yannick Champion, From diluted solid solutions to high entropy alloys: On the evolution of properties with composition of multi components alloys, *Materials Science & Engineering A* <http://dx.doi.org/10.1016/j.msea.2017.04.079>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

# From diluted solid solutions to high entropy alloys: on the evolution of properties with composition of multi-components alloys

Mathilde Laurent-Brocq<sup>1</sup>, Loïc Perrière<sup>1</sup>, Rémy Pirès<sup>1</sup>, Frédéric Prima<sup>2</sup>, Philippe Vermaut<sup>2</sup>, Yannick Champion<sup>3</sup>

<sup>1</sup> Université Paris Est, ICMPE (UMR 7182), CNRS, UPEC, F- 94320 THIAIS France

<sup>2</sup> PSL Research University, ChimieParisTech - CNRS, Institut de Recherche de Chimie Paris, 75005, Paris, France

<sup>3</sup> Univ. Grenoble Alpes, CNRS, Grenoble INP, SIMaP, F-38000 Grenoble

## Corresponding author

First name: Mathilde ; Family name: Laurent-Brocq

E-mail: laurent-brocq@icmpe.cnrs.fr

Phone number : +33 (0)1 56 70 30 65

Postal adress : 2-8, rue Henri Dunant (bât D) F-94320 Thiais, France

## Authors e-mail adress

Loïc Perrière: perriere@icmpe.cnrs.fr

Rémy Pirès: pires@icmpe.cnrs.fr

Frédéric Prima : frederic.prima@chimie-paristech.fr

Philippe Vermaut : philippe.vermaut@chimie-paristech.fr

Yannick Champion: yannick.champion@simap.grenoble-inp.fr

## Abstract

To study the evolution of structural and mechanical properties with composition, 10  $\text{Cr}_x\text{Mn}_x\text{Fe}_x\text{Co}_x\text{Ni}_{100-4x}$  alloys were processed and characterized by X-ray diffraction and nanoindentation. Those alloys are all single-phase solid-solutions and their composition ranges from conventional diluted multi-component alloys (MCA) to high entropy alloys (HEA). The lattice parameter and the hardness were measured and were compared to existing models. The hardest studied alloy turns out to be the non-equimolar  $\text{Cr}_{10}\text{Mn}_{10}\text{Fe}_{10}\text{Co}_{10}\text{Ni}_{60}$ . More precisely, it was shown that, when the composition evolves from diluted MCA to HEA: (i) the lattice parameter increases and follows a Vegard's law up to  $4x = 40$  at. %; (ii) the hardness increases and follows a Mott-Nabarro-Labush law up to  $4x = 40$  at. % and then decreases. This breakpoint of the evolution of both lattice

Download English Version:

<https://daneshyari.com/en/article/5456010>

Download Persian Version:

<https://daneshyari.com/article/5456010>

[Daneshyari.com](https://daneshyari.com)