Accepted Manuscript

Thermodynamic assessment of the dysprosium-gold binary system

Samira OTMANI, Kamal MAHDOUK

PII: S0925-8388(15)30399-6

DOI: 10.1016/j.jallcom.2015.07.002

Reference: JALCOM 34690

To appear in: *Journal of Alloys and Compounds*

Received Date: 5 February 2015

Revised Date: 8 May 2015

Accepted Date: 1 July 2015

Please cite this article as: S. OTMANI, K. MAHDOUK, Thermodynamic assessment of the dysprosium-gold binary system, *Journal of Alloys and Compounds* (2015), doi: 10.1016/j.jallcom.2015.07.002.

Thermodynamic assessment of the dysprosium-gold binary system

Samira OTMANI*and Kamal MAHDOUK

Laboratory of Thermodynamics and Energetics, Faculty of science,

Ibn Zohr University, BP 8106, 80006 Agadir Morocco

*Corresponding author: (samira.otmani@edu.uiz.ac.ma)

Abstract:

Phase relationships in Dy-Au binary system has been thermodynamically assessed by using the CALPHAD technique. Liquid and the solution phases, fcc_A1, bcc_A2 and hcp_A3, were treated as a substitutional solution model. The binary intermetallic compounds are treated as stoichiometric phases. All the thermodynamic parameters of various phases have been optimized and the calculated results are confronted with experimental data.

Keywords: Dy-Au phase diagram, CALPHAD method, Thermodynamic Assessment, rare earth metals.

1. Introduction:

It is well established that gold, as an element, has many favorable physical and chemical properties (i.e. good thermal and electrical conductivity, excellent corrosion resistance). The great potential for gold catalysts, in the form of supported nano-particles, has opened up a new field of research [1], and the increasing number of publications in this domain over the last few years reflects this interest.

On the other hand, Rare Earth (RE) metals, which can react with almost all the elements in the periodic table, are widely used in the industry. We found them used as the green component in trichromatic lamps (Lamp phosphors) [2], used in the bulk of the material or at the contact surface in order to protect materials against corrosion in various environments [3]. They have also increasingly been used in Micro-Electro-Mechanical Systems (MEMS) packaging in order to promote bonding [4-6].

To utilize the full technological potential of the RE metals, it is essential to have a fundamental knowledge about the Au–RE systems, such as information about the phase equilibrium and the related thermodynamic data. Unfortunately, the phase diagrams for Au–RE have not been systematically investigated, with the notable exceptions of the