metals

MDPI

Editorial

Intermetallics

Ana Sofia Ramos

CEMMPRE, Department of Mechanical Engineering, University of Coimbra, R. Luís Reis Santos, 3030-788 Coimbra, Portugal; sofia.ramos@dem.uc.pt; Tel.: +351-239-790700

Academic Editor: Hugo F. Lopez
Received: 10 October 2017; Accepted: 18 October 2017; Published: 20 October 2017

1. Introduction

The combination of low density, high strength, and good corrosion resistance makes intermetallics promising for structural applications, especially at high temperatures and under severe environments [1]. These materials have also potential for functional applications since some intermetallic phases have unique properties, such as shape memory or thermo electric effect. Intermetallic phases of interest include aluminides, silicides, Laves and Heusler phases, among others. Intermetallic compounds can be produced from metals that exothermically react with each other releasing energy useful for several applications, including joining [2–4]. As a result of the increasing demand for novel/advanced materials with improved properties, recent years have been marked by the return of intermetallics. Proof of this is the ongoing and future conferences/symposia dedicated to intermetallics.

2. Contributions

The quality and variety of the 17 papers published in *Metals*' "Intermetallics 2016" special issue reflects the interest in the intermetallics field. Processing and joining of intermetallics, their mechanical properties and oxidation/corrosion behavior, phase transformations involving intermetallics, modelling, and numerical simulation have been the topic of these papers. The joining topic stood out with five papers focusing both the joining of intermetallic materials and the formation of intermetallic compounds during soldering and diffusion bonding processes.

The following materials were studied, with particular attention on the aluminides:

- TiAl, FeAl, (Ni,Pt)Al, ZrCuAl and FeCrAl;
- Ta_5Si_3;
- Ti-6Al-4V;
- TiNi;
- Cu_6Sn_5 and Cu_3Sn;
- TiZr;
- Fe_2Mo;
- $Bi_2Te_{2.55}Se_{0.45}$, Sn–Te–Se–Bi intermetallics and Ni_3Sn_4

Composites involving intermetallics were the subject of two papers, while two papers were dedicated to metallic glasses. For the materials investigated, the simulation and experimental works carried out allowed understanding the relation between microstructure and properties aiming at their use as structural materials at high and ultra-high temperatures, as well as their use in aerospace/aeronautic, automobile, electronic, tribological, and biomedical applications. Whatever the application, joining of intermetallics to other materials is of paramount importance which is reflected in this issue.

As guest editor of "Intermetallics 2016" special issue, I think it will contribute to the progress of the state of the art.

3. Conclusions

A variety of papers have been published covering important aspects related to intermetallics. Nevertheless, there are still several challenges to overcome in order to optimize intermetallics' properties and enlarge their field of application. Therefore, further issues in this field would be welcome.

Acknowledgments: I would like to thank all the authors for their contributions, the reviewers for the comments, and the *Metals* editorial staff for the effort in putting up this special issue.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Westbrook, J.H. Historical Sketch. In *Intermetallic Compounds—Principles and Practice*; Westbrook, J.H., Fleischer, R.L., Eds.; John Wiley & Sons: Chichester, UK, 1995; Volume 1, pp. 3–18. ISBN 0 471 94219 7.
2. Duckham, A.; Spey, S.J.; Wang, J.; Reiss, M.E.; Weihs, T.P.; Besnoin, E.; Knio, O.M. Reactive nanostructured foil used as a heat source for joining titanium. *J. Appl. Phys.* **2004**, *96*, 2336–2342. [CrossRef]
3. Ramos, A.S.; Vieira, M.T.; Duarte, L.; Vieira, M.F.; Viana, F.; Calinas, R. Nanometric multilayers: A new approach for joining TiAl. *Intermetallics* **2006**, *14*, 1157–1162. [CrossRef]
4. Cao, J.; Feng, J.C.; Li, Z.R. Microstructure and fracture properties of reaction-assisted diffusion bonding of TiAl intermetallic with Al/Ni multilayer foils. *J. Alloys Compd.* **2008**, *466*, 363–367. [CrossRef]