

1. Record Nr.	UNINA9910780724903321
Titolo	Properties and applications of complex intermetallics [[electronic resource] /] / edited by Esther Belin-Ferre
Pubbl/distr/stampa	Singapore ; ; London, : World Scientific, c2010
ISBN	1-282-75782-2 9786612757822 981-4261-64-5
Descrizione fisica	1 online resource (458 p.)
Collana	Book series on complex metallic alloys ; ; v. 2
Altri autori (Persone)	Belin-FerreEsther
Disciplina	669
Soggetti	Alloys Intermetallic compounds Physical metallurgy
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	CONTENTS; Foreword; Chapter 1: Metallic, Complex and So Different Jean-Marie Dubois; 1. Introduction; 2. Historical Background; 3. Complexity in Real and Reciprocal Space; 3.1. The example of compounds of Al, Mg and Zn; 3.2. Hierarchy, groups of atoms and clusters; 3.3. The key role played by disorder and defects; 3.4. Definition of a CMA in reciprocal space; 4. Metallurgy and Surface Chemistry of CMAs; 4.1. Preparation methods; 4.2. Corrosion, oxidation and interaction with chemical atmosphere; 4.3. Atom transport; 4.4. Essential mechanical properties; 4.5. Metadislocations 5. Phase Selection 5.1. Hume-Rothery rules; 5.2. More on specific Al-TM CMAs; 5.3. The case of g-brass type CMAs; 5.4. The case of Al-Mg (-Zn) alloys; 5.4.1. Locating d-like states in Al-TM based alloys; 5.4.2. Alloys based on Al, Mg, and possibly containing Zn; 5.4.3. A supplementary mechanism for phase selection and stability?; 6. Properties of Al-Transition Metal(s) CMAs; 6.1. The essential property of Al-TM CMAs; 6.2. Transport properties; 6.3. Solid-solid contact; 6.3.1. Fretting; 6.3.2. Friction anisotropy; 6.3.3. Surface energy; 6.4. Wetting against liquid metals 6.5. Wetting against polar liquids7. Inverse Nano-Structuration; 8.

Conclusion; Acknowledgments; References; Chapter 2: Solution Growth of Intermetallic Single Crystals: A Beginner's Guide Paul Canfield; 1. Introduction; 2. What Do You Need?; 3. Planning the Growth; 4. Assembling the Growth; 5. Running the Growth; 6. Decanting; 7. Opening the Growth and Planning the Next One; 8. Final Remarks; Acknowledgments; References; Chapter 3: Thermal Conductivity of Complex Metallic Alloys Ana Smontara, Ante Bilu Deljko Bihar and Igor Smiljani; 1. Introduction  
2. Basics of the Thermal Conductivity Measurements 2.1. Heat losses in thermal conductivity measurements; 2.2. Example - thermal conductivity of magnetite  $\text{Fe}_3\text{O}_4$ ; 3. The Analysis of Experimental Thermal Conductivity Data; 3.1. Thermal conductivity of metals and alloys; 3.2. Thermal conductivity of complex metallic alloys; 3.2.1. ' and -phases in the  $\text{AlPdMn}$  complex metallic system; 3.2.2. -  $\text{Al}_3\text{Mg}_2$  complex metallic alloy; 3.2.3.  $\text{Mg}_{32}(\text{Al,Zn})_{49}$  complex metallic alloy; 3.2.4. e-phase in the  $\text{AlPd}(\text{Fe,Co,Rh})$  complex metallic system; 4. Conclusions; Acknowledgments; References  
Chapter 4: Thermoelectric Materials Silke Pashen 1. Introduction; 2. Cage Compounds; 2.1. Definitions; 2.1.1. Guest/host atoms; 2.1.2. Coordination number (c.n.); 2.1.3. Bond length/strength; 2.1.4. Empty host; 2.2. Examples; 2.2.1. Filled skutterudites; 2.2.2. Intermetallic clathrates; 2.2.3. Clathrate-like compounds; 2.2.4. Oxides; 2.3. Characteristic properties of cage compounds; 2.3.1. Rattling/tunneling; 2.3.2. Phonon glass-electron crystal; 2.4. Tuning for optimized performance; 2.4.1. Stoichiometry; 2.4.2. Doping; 2.4.3. Substitution; 2.4.4. Micro/Nanostructuring  
3. Strongly Correlated Cage Compounds

---

#### Sommario/riassunto

Complex metal alloys (CMAs) comprise a huge group of largely unknown alloys and compounds, where many phases are formed with crystal structures based on giant unit cells containing atom clusters, ranging from tens of to more than thousand atoms per unit cell. In these phases, for many phenomena, the physical length scales are substantially smaller than the unit-cell dimension. Hence, these materials offer unique combinations of properties which are mutually exclusive in conventional materials, such as metallic electric conductivity combined with low thermal conductivity, good light absorption

---