APDIC Report 2023

Italian activity in phase diagram science

Presented by Gabriele Cacciamani

Looking for ***Phase diagram*** AND ***Alloy*** in Web of Science
from 2021 to 2023

			Papers
Papers in the world literature			1683
Ranking by Country	1	China	586
	2	USA	255
	3	Russia	173
	4	Japan	151
	5	Germany	146
		. . . .	
	21	Italy	22
		. . . .	
Ranking in Italy	1	University of Genova + ICMATE Institute (CNR)	9
	2	University + Polytechnic of Torino	3
		. . . .	

Recent Papers by researchers from

University of Genova

and

CNR-ICMATE Genova

2023 Cacciamani, G.; Fenocchio, L.; Dreval, L. **Al-Fe-Ni Ternary Phase Diagram Evaluation**
MSI-Eureka 10.10205.3.7

2022 Ostrowska, M; Riani, P; Bocklund, B; Liu, ZK; Cacciamani, G
Thermodynamic modeling of the Al-Co-Cr-Fe-Ni high entropy alloys supported by key experiments
10.1016/j.jallcom.2021.162722

S. Gambaro, F. Valenza, M.L. Muolo, A. Passerone, P. Riani, G. Cacciamani
Zirconia-high entropy alloys joints for biomedical applications: The role of Ag-based fillers on interfacial reactivity
10.1016/j.jallcom.2022.164764

Akbar, F; Martinelli, A; Curlik, I; Reiffers, M; Giovannini, M
Phase relations at 600 degrees C in ytterbium-palladium-indium system
10.1016/j.jallcom.2022.165882

2021 Borzone, G; Delsante, S; Li, D; Novakovic, R
New Insights into Phase Equilibria of the Sb-Sn System
10.1007/s11669-020-00849-7

Wang, Y; Ostrowska, M; Cacciamani, G
Thermodynamic modeling of selected ternary systems containing Y and CALPHAD simulation of CoNiCrAlY metallic coatings
10.1016/j.calphad.2020.102214

Valenza, F; Sitzia, S; Cacciamani, G; Muolo, ML; Passerone, A; Wojewoda-Budka, J; Morgiel, J; Sobczak, N
Wetting and interfacial reactivity of Ni-Al alloys with Al2O3 and ZrO2 ceramics
10.1007/s10853-021-05769-6

Giuranno, D; Gambaro, S; Bruzda, G; Nowak, R; Polkowski, W; Sobczak, N; Delsante, S; Novakovic, R
Interface Design in Lightweight SiC/TiSi2 Composites Fabricated by Reactive Infiltration Process: Interaction Phenomena between Liquid Si-Rich Si-Ti Alloys and Glassy Carbon
10.3390/ma14133746

Recent Papers by researchers from

Other Italian Institutions

2022 Cheze, C; Riva, FR; Di Bella, G; Placidi, E; Prili, S; Bertelli, M; Fattorini, AD; Longo, M; Calarco, R; Bernasconi, M; Kheir, OA; Arciprete, F
Interface Formation during the Growth of Phase Change Material Heterostructures Based on Ge-Rich Ge-Sb-Te Alloys
NANOMATERIALS 10.3390/nano12061007

2021 Scaglione, F; Arnaboldi, S; Viscardi, C; Baricco, M; Palumbo, M
Solidification Calculations of Precious Alloys and Al-Base Alloys for Additive Manufacturing
METALS 10.3390/met12020322

Kheir, OA; Bernasconi, M
High-Throughput Calculations on the Decomposition Reactions of Off-Stoichiometry GeSbTe Alloys for Embedded Memories
NANOMATERIALS 10.3390/nano11092382

Wartbichler, R; Clemens, H; Mayer, S; Ghibaudo, C; Rizza, G; Galati, M; Iuliano, L; Biamino, S; Ugues, D
On the Formation Mechanism of Banded Microstructures in Electron Beam Melted Ti-48Al-2Cr-2Nb and the Design of Heat Treatments as Remedial Action
ADVANCED ENGINEERING MATERIALS 10.1002/adem.202101199

Czaja, P; Szczerba, MJ; Villa, E; Villa, F; Chernenko, V
Orientation dependent stress-induced intermartensitic transformations in Ni50.3Mn28.7Ga21.0 single crystal
JOURNAL OF APPLIED PHYSICS 205102 10.1063/5.0069324

Bacelis, A; Veleva, L; Feliu, S; Cabrini, M; Lorenzi, S
Corrosion Activity of Carbon Steel B450C and Low Chromium Ferritic Stainless Steel 430 in Cement Extract Solution
BUILDINGS 10.3390/buildings11060220

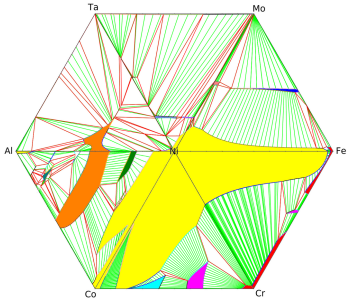
Mazziotti, MV; Jarlborg, T; Bianconi, A; Valletta, A
Room temperature superconductivity dome at a Fano resonance in superlattices of wires
EPL 10.1209/0295-5075/134/17001

University of Genova
Department of Chemistry and Industrial Chemistry

COMputational THERmodynamics of MATERIALS

TO UNDERSTAND MATERIALS PROPERTIES
TO SIMULATE MATERIALS BEHAVIOUR
TO DESIGN NEW MATERIALS

https://comatresearchgroup.unige.it/



GHEA (Genoa High Entropy Alloys) thermodynamic database

A thermodynamic database for high temperature HEAs and Superalloys under continuous development

COMAT Research Group

University of Genova

At present GHEA includes:

- **15 elements**: Al, B, C, Co, Cr, Fe, Mo, Ni, Re, Si, Ta, Ti, W, Y.
- **200 phases** modelled with particular attention to the consistency between thermodynamic model and crystal structure.
- **67 assessed binary** systems
- **80 assessed ternary** systems
- fully assessed 6 and 7-component systems based on **Al-Co-Cr-Fe-Ni** combined with **Mo, Ta, W, C**

In addition to ad hoc assessments, most thermodynamic assessments taken from literature have been partially or completely reassessed in order to be consistent with adopted phase models and/or endmembers.

For further information visit https://comatresearchgroup.unige.it/node/252

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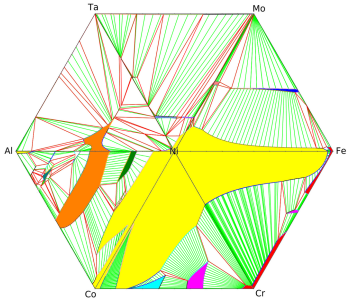

GHEA (Genoa High Entropy Alloys) thermodynamic database

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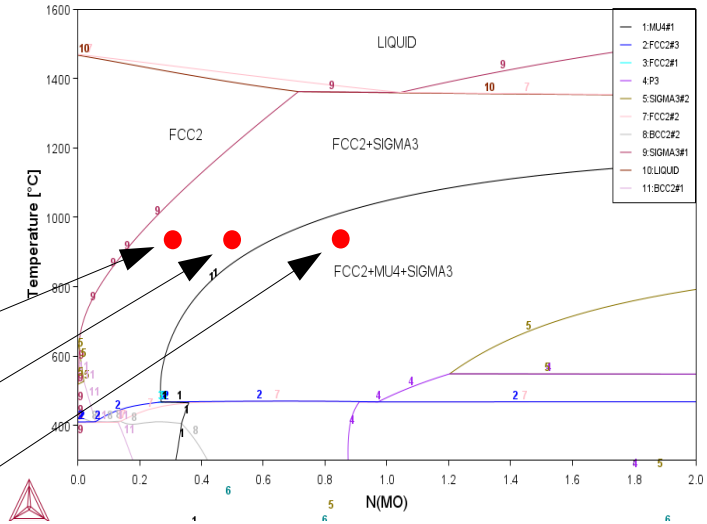
Example of GHEA validation

Full agreement between GHEA results and experimental data from literature in the 6-component HEA system Co-Cr-Fe-Mo-Ni:

FCC + σ in $CoCrFeNiMo_{0.3}$

FCC + σ in $CoCrFeNiMo_{0.5}$

FCC + σ + μ in $CoCrFeNiMo_{0.85}$



T. Shun et al., Materials Characterization 70 (2012), 63-67

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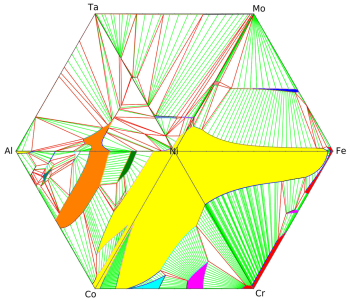

GHEA (Genoa High Entropy Alloys) thermodynamic database

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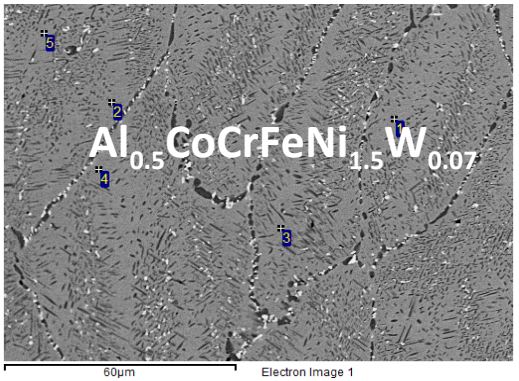
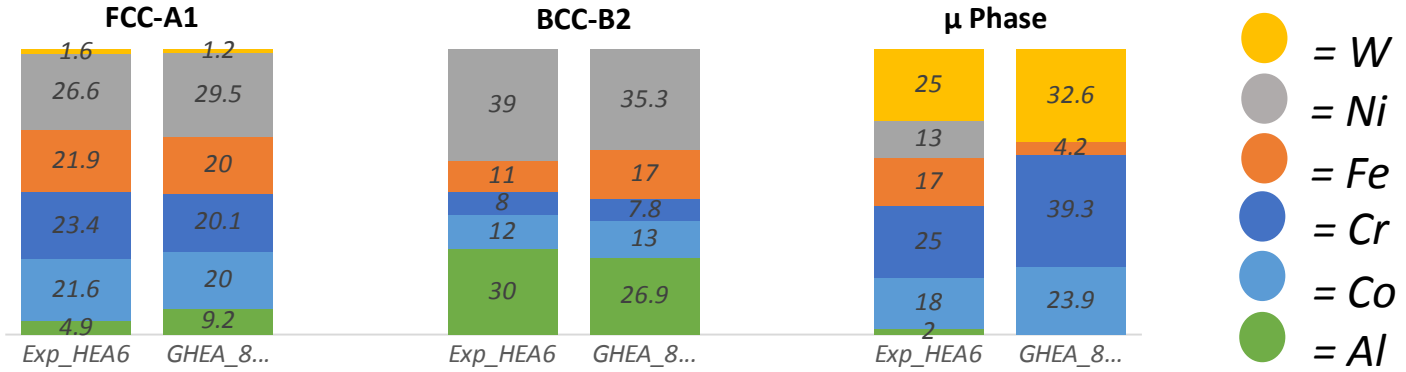
Example of GHEA validation

Good agreement between GHEA results and our own experimental data in the 6-component HEA system Co-Cr-Fe-Ni-W





Thank you for attention