MSI / MSIT[®] activities in the year 2023-2024

APDIC Report, May 2024

Including the activities of MSIT[®], Materials Science International Team

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MSIT[®] Community Activities

8th MSIT Minter School on Materials Chemistry

The <u>8th MSIT Winter School on Materials Chemistry</u> was held at the Castle Ringberg on 21 - 26 January 2024 in parallel with the 38th MSIT Annual Workshop.

Organised by:

MSI, Materials Science International GmbH, Germany/ Dr. Svitlana Iljenko Hampton Thermodynamics Ltd., United Kingdom/ Dr. Andrew Watson Max-Planck-Institut für Eisenforschung GmbH, Germany/ Dr. Frank Stein, Dr. Martin Palm

The aim of the MSIT Winter School is to provide first-class tuition in a selection of subjects closely associated with the study of phase equilibria in Materials Science. Each module involves lectures, demonstrations and problems classes. The lectures are given mainly by members of the MSIT who are world experts in their respective fields. The <u>Programme</u> of the 8th MSIT Winter School has included the following courses spreading over 36 hours in total:

The format of the Winter School, which combines theory and practice of the evaluation of phase equilibria and thermodynamics, leading to the thermodynamic modelling of a real binary system has proved to be extremely popular. The MSIT Winter School became established as the premier event for the training of postgraduate students and more mature researchers in the basic principles and the applications of phase equilibria and thermodynamics.

In 2025 we will go to another castle Burg Ebernburg in February. Registration will be opened in June 2024 <u>https://www.msiport.com/msit-events/msit-winter-school/next-msit-winter-school/</u>

38th MSIT 🔉 Workshop

International Seminar on the Evaluation of Heterogeneous Multicomponent Equilibria

The Annual Meeting of the MSIT members has taken place in parallel with the <u>8th MSIT Winter School</u>. The Group Work on **Critical Evaluation** of constitutional data at the <u>MSIT Workshop</u> works in the following way: small groups of 3-5 scientists write together critical evaluation of data on phase diagrams of a particular system. The literature for evaluation and working infrastructure are provided by MSI. In the group work there is always a knowledge transfer from the senior scientists experienced in the evaluation work to the younger scientists. The Guidelines for Critical Evaluation you can <u>see here</u>.





International Workshop

on the Evaluation of Heterogeneous Multicomponent Equilibria

29 May to 2 June 2023

Accra, Ghana

14 to 18 August 2023

Accra, Ghana

Organised by:

MSI, Materials Science International Services GmbH & African Research University Alliance -Centre of Excellence in Materials, Energy and Nanotechnology

Hosted by:

University of Witwatersrand (Prof. L. Cornish) & University of Ghana (Dr. D. Dodoo-Arhin)

The 2nd and 3rd MSIT-Africa Meetings hosted about 30 participants who have been working in groups on **Critical Evaluation** of constitutional data of binary & ternary refractory materials systems with the great outcome of 11 publications, either in the Ternary Alloys book or MSI Eureka.

Successful start of the new series of educational events



22 - 23 November 2023, Stuttgart, Germany

Scope

The seminar will be focused on permanent magnets and the supply of the raw materials. We will start with fundamentals of the RE elements and magnetism, the principals of RE permanent magnets chemistry, thermodynamics, and constitution, same as measurement techniques. Showing the processes from mine to magnet and recycling is the approach to close the circle for sustainability and environmental protection of Earth. Applications and the future of global markets will be shown, as well as new opportunities of global sourcing. Organised by:

- MSI, Materials Science International Services GmbH, Germany
- and ppm materials GmbH, Kirchheim/Teck, Germany

Chairman: Dr. Bernd Grieb

Topics:

- Raw Materials and Resources
- REE Processing
- Magnet Materials Basics
- Alloying
- Magnet Production
- Mechanical Processing
- Magnetization
- Soft Magnetics for Permanent Magnetics
- Recycling
- Applications
- Market
- Geopolitical Aspects
 Guarant Clobal Aspects
- Current Global Activities

https://www.msiport.com/msit-school/msit-advanced-school/

ANNOUNCEMENT: UPCOMING MSIT EVENTS



where science meets technology

Seminar on Rare-Earth Materials & Magnet Technology

12 - 13 November 2024, Stuttgart, Germany



- Raw Materials and Resources
- > REE Processing
- Magnet Materials Basics
- > Alloying
- Magnet Production
- Mechanical Processing
- Magnetisation

- Soft Magnetics for Permanent Magnetics
- > Recycling
- > Applications
- Global Market World
- Geopolitical Aspects
- Current Global Activities

MSIT Advanced School "Crystallography in Materials Science"

Towards a Unified View on Crystal Structure, Microstructure and Thermodynamics

Organised by MSI, Materials Science International Services GmbH, Germany Technical Unversity Bergakademie Freiberg, Germany

Chaired by Prof. Andreas Leineweber

17 - 20 February 2025 Castle Ebernburg, Germany



As implied by the title of the school, it will teach advanced knowledge in crystallography (symmetry) and diffraction, and will connect this knowledge to the fields of thermodynamics and microstructure.

This school is designed for researchers who recognize the relevance of working with crystal structures in their work. The intended audience includes postgraduates from chemistry, physics, materials science or crystallography, e.g. PhD students, academics, R&D specialists with some prior knowledge in crystallography (crystal chemistry, symmetry, diffraction analysis) and thermodynamics/phase diagrams.

A key emphasis of the program will be the crucial interplay between crystal structure, thermodynamics, and microstructure. Understanding these relationships is often essential for understanding a materials system under consideration.

The audience should bring sound initial knowledge in at least some of these areas, which will be further expanded throughout the course of the school.



https://www.msiport.com/msit-events/msit-advanced-school/

9th MSIT Minter School on Materials Chemistry

Organised by

MSI, Materials Science International Services GmbH, Germany Hampton Thermodynamics, UK

Max-Planck-Institut für Eisenforschung GmbH, Germany

Dr. Andrew Watson, Dr. Frank Stein, Dr. Svitlana Iljenko, Dr. Martin Palm

The Programme includes

- Principles of Chemical Thermodynamics
- · Phase Diagrams and Phase Equilibria (basic & advanced level), incl. practical session
- · Experimental Determination of Phase Diagrams, incl. practical session
- · Crystallography, incl. practical session
- · Experimental Methods in Thermodynamics, incl. practical session
- Critical Evaluation of Constitutional Data
- Application of DFT in the Context of Phase Diagram Modelling
- Computational Materials Thermodynamics
- Calphad Method, incl. practical session "Thermodynamic Modelling of Phase Equilibria"



https://www.msiport.com/msit-events/msit-winter-school/next-msit-winter-school/

39th MSIT A Annual Workshop

International Seminar on the Evaluation of Heterogeneous Multicomponent Equilibria

> 16 - 21 February 2025 Castle Ebernburg Germany

The Workshop comprises usual group work on critical evaluation of constitutional data and presentations by participants.

It will take place in parallel with the 9th MSIT Winter School.

The delagates of both events will have the opportunity to interact and so learn of the important work that the team undertakes.



16 - 21 February 2025 Castle Ebernburg Germany

The volume 22 of Ternary Alloys has been published



The Volume 22 of the book series *Ternary Alloys- A Comprehensive Compendium of Evaluated Constitutional Data and Phase Diagrams*

"Refractory Material Systems for Industrial Applications" is published in April 2024.

ISBN 978-3-932120-53-4; Editors: Hans Jürgen Seifert and K.C. Hari Kumar; Authors: MSIT[®]; 522 pages. <u>↓ Table of content</u> © Materials Science International Services GmbH, D-70565 Stuttgart (Germany), 2024

31 key ternary systems relevant to refractory ceramics, composites, and alloys. Such materials should withstand high temperatures for extended durations. Their phase stability & chemical composition should not

undergo significant changes during service. Their ability to resist oxidation, corrosion, & wear makes them the best choice for applications in extreme environments. This volume will be of interest to the scientific and engineering community, covering areas such as material development, processing, and finally, their applications in sectors such as aerospace, nuclear energy, chemical industry, lighting, etc.

The system reports are arranged in the alphabetical order and have a standard format, allowing easy access to the required data. The following information is provided: liquidus projections, isothermal and vertical sections, quasibinary sections, reaction schemes, invariant equilibria, crystallographic data, thermodynamic data and materials properties, accompanied by short descriptive texts and extensive references.

→ <u>Order form</u>

Starting with the Volume 19, MSI has changed slightly the concept of the handbook series "Ternary Alloys. A Comprehensive Compendium of Evaluated Constitutional Data and Phase Diagrams". Instead of exploring alphabetically all ternary systems based on one chemical element, like Al-X-Y or Mg-X-Y, the future volumes will be dedicated to particular classes of materials or particular application areas. Selected are ternary and some binary systems of importance to industrial alloy development and systems which gained scientific interest in the recent years.

MSI EUREKA

Content as of May 2024 (continuously updated)

Links to Literature:	519,500 citations, on 79,000 materials systems
MSIT Binary & Ternary Evaluations:	4650 material systems, evaluated by MSIT
Diagrams as Published:	1710 systems, not evaluated by MSIT
Research Results:	4299 summaries, from 2022 include brief original publications
Phase diagrams and graphs:	16,500
Tables:	10,300
Total:	519,070 entries & documents
	79,100 systems (from unary till 15-component systems)
	> 10,5000 new entries added since last APDIC Meeting

2023 Publications in MSI Eureka®

System	Publication in the Category "Phase Diagram Evaluation" in MSI Eureka [®]
Al-Cu-Fe	Wang, C. Ping, Liu, X. Jun, Zhang, L., Ishida, K., Moharana, N., Kumar, K. C Hari, "Al-Cu-Fe Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 95 , 10.14601.3.5 (2023), <u>https://doi.org/10.7121/msi-eureka-10.14601.3.5</u>
Al-Fe-Mn	Ran, Q., Pisch, A., Walnsch, A., Kriegel, M. J., "Al-Fe-Mn Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 95 , 10.10204.3.0 (2023), <u>https://doi.org/10.7121/msi-eureka-10.10204.3.0</u>
Al-Fe-N	Jehn, H. A., Perrot, P., Tomashyk, V., "Al-Fe-N Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 10.14876.3.8 (2023), <u>https://doi.org/10.7121/msi-eureka-10.14876.3.8</u>
Al-Fe-Nb	Malfliet, A., Stein, F., Vaubois, T., Kumar;, K. Hari, Stein, F., "Al-Fe-Nb Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 10.18061.4.8 (2023), <u>https://doi.org/10.7121/msi-eureka-10.18061.4.8</u>
Al-Fe-Ni	Cacciamani, G., Fenocchio, L., Dreval, L., "Al-Fe-Ni Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 95 , 10.10205.3.7 (2023), <u>https://doi.org/10.7121/msi-eureka-10.10205.3.7</u>
Al-Fe-O	Kubaschewski+, O., Schmid-Fetzer, R., Rokhlin, L., Cornish, L., Fabrichnaya, O., Dreval, L., "Al-Fe-O Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 95 , 10.11481.3.1 (2023), <u>https://doi.org/10.7121/msi-eureka-10.11481.3.1</u>
Al-Fe-P	Schmid-Fetzer, R., Tomashyk, V., Dreval, L., "Al-Fe-P Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science

	International Services GmbH, Stuttgart, 96 , 10.20741.3.6 (2023), https://doi.org/10.7121/msi-eureka-10.20741.3.6
Al-Fe-S	Bochvar, N., Legendre, B., Kubaschewski, O., Cornish, L., Ukabhai, K. Dyal, Watson, A., "Al-Fe-S Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 10.19269.2.4 (2023), <u>https://doi.org/10.7121/msi-eureka-10.19269.2.4</u>
Al-Fe-Si	Ghosh, G., Li, X., Liu, S., Du, Y., Turchanin, M., Dreval, L., "Al-Fe-Si Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 95 , 10.14596.5.2 (2023), <u>https://doi.org/10.7121/msi-eureka-10.14596.5.2</u>
Al-Fe-Sn	Gama, S., Grieb, B., Tretyachenko+, L., Palm, M., "Al-Fe-Sn Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 10.19762.2.5 (2023), <u>https://doi.org/10.7121/msi-eureka-10.19762.2.5</u>
Al-Fe-Ta	Bondar, A., Tymoshenko, O., Dovbenko, O., "Al-Fe-Ta Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 10.16122.3.7 (2023), <u>https://doi.org/10.7121/msi-eureka-10.16122.3.7</u>
Al-Fe-Ti	Stein, F., Korniyenko, K., "Al-Fe-Ti Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 95 , 10.16711.4.1 (2023), <u>https://doi.org/10.7121/msi-eureka-10.16711.4.1</u>
Al-Fe-V	Ghosh, G., Korniyenko, K., "Al-Fe-V Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 10.19028.3.8 (2023), <u>https://doi.org/10.7121/msi-eureka-10.19028.3.8</u>
Al-Fe-Zn	Ghosh, G., Palm, M., "Al-Fe-Zn Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 10.17658.4.5 (2023), <u>https://doi.org/10.7121/msi-eureka-10.17658.4.5</u>
Al-Fe-Zr	Stein, F., "Al-Fe-Zr Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 95 , 10.16088.3.5 (2023), <u>https://doi.org/10.7121/msi-eureka-10.16088.3.5</u>
Al-O-Ta	Gebauer, J., Pisch, A., "Al-O-Ta Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98 , 10.13522.1.8 (2023), <u>https://doi.org/10.7121/msi-eureka-10.13522.1.8</u>
B-C-Hf	Rogl, P., "B-C-Hf Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97 , 10.11531.3.1 (2023), <u>https://doi.org/10.7121/msi-eureka-10.11531.3.1</u>
C-Co-Fe	Watson, A., Cornish, L., "C-Co-Fe Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97 , 10.10106.2.1 (2023), <u>https://doi.org/10.7121/msi-eureka-10.10106.2.1</u>
Fe-Mo-Ti	Watson, A., Mellor, R. FL, Palm, M., Buch, J., Ganninger, P. Gabor, "Fe-Mo-Ti Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98 , 10.14961.1.3 (2023), <u>https://doi.org/10.7121/msi-eureka-10.14961.1.3</u>

Hf-O-Ta	Tyshchenko, I., Korniyenko, K., Löffler, M., Fabrichnaya, O., "Hf-O-Ta Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98 , 10.11425.2.6 (2023), <u>https://doi.org/10.7121/msi-eureka-10.11425.2.6</u>
Mo-Nb-V	Bishara, H., Stein, F., "Mo-Nb-V Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 10.14285.1.2 (2023), <u>https://doi.org/10.7121/msi-eureka-10.14285.1.2</u>
Mo-Si-Ti	Bondar, A., Lukas, H. Leo, Czerny, A. Klaus, Romaka, V., "Mo-Si-Ti Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97 , 10.18571.2.8 (2023), <u>https://doi.org/10.7121/msi-eureka-10.18571.2.8</u>
Mo-Ti-Zr	Watson, A., de Abreu, D., Cornish, L., Klenam, D., "Mo-Ti-Zr Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98 , 10.18033.2.8 (2023), <u>https://doi.org/10.7121/msi-eureka-10.18033.2.8</u>
Nb-Ni-V	Bishara, H., Yesilcicek, Y., Stein, F., "Nb-Ni-V Ternary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98 , 10.15382.2.2 (2023), <u>https://doi.org/10.7121/msi-eureka-10.15382.2.2</u>
P-Pt	Schmitt, L., Hack, K., Lippmann, S., "P-Pt Binary Phase Diagram Evaluation", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97 , 20.30461.1.1 (2023), <u>https://doi.org/10.7121/msi-eureka-</u> 20.20461.1.1
	<u>20.30461.1.1</u>
System	20.30461.1.1 Publications in the Category "Diagrams as Published" in MSI Eureka
System B-Ni	20.30461.1.1 Publications in the Category "Diagrams as Published" in MSI Eureka "B-Ni Phase Diagrams as Published", in MSI Eureka, Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98, 30.11581.1.4 (2023), http://www.msi-eureka.com/full-html/30.11581.1.4/B- Ni_Phase_Diagrams_as_Published
System B-Ni B-Si	20.30461.1.1 Publications in the Category "Diagrams as Published" in MSI Eureka "B-Ni Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98, 30.11581.1.4 (2023), http://www.msi-eureka.com/full-html/30.11581.1.4/B- Ni Phase Diagrams as Published "B-Si Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97, 30.11585.2.2 (2023), http://www.msi-eureka.com/full-html/30.11585.2.2/B- Si_Phase_Diagrams_as_Published
System B-Ni B-Si Fe-Si	20.30401.1.1 Publications in the Category "Diagrams as Published" in MSI Eureka "B-Ni Phase Diagrams as Published", in MSI Eureka, Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98, 30.11581.1.4 (2023), http://www.msi-eureka.com/full-html/30.11581.1.4/B- Ni Phase Diagrams as Published "B-Si Phase Diagrams as Published", in MSI Eureka, Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97, 30.11585.2.2 (2023), http://www.msi-eureka.com/full-html/30.11585.2.2/B- Si Phase Diagrams as Published "Fe-Si Phase Diagrams as Published", in MSI Eureka, Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97, 30.11585.2.2 (2023), http://www.msi-eureka.com/full-html/30.11585.2.2/B- Si Phase Diagrams as Published "Fe-Si Phase Diagrams as Published", in MSI Eureka, Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98, 30.11113.2.6 (2023), http://www.msi-eureka.com/full-html/30.11113.2.6/Fe- Si Phase Diagrams as Published
System B-Ni B-Si Fe-Si Fe-Ti	20.30461.1.1 Publications in the Category "Diagrams as Published" in MSI Eureka "B-Ni Phase Diagrams as Published", in MSI Eureka, Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98, 30.11581.1.4 (2023), http://www.msi-eureka.com/full-html/30.11581.1.4/B- Ni Phase Diagrams as Published "B-Si Phase Diagrams as Published "B-Si Phase Diagrams as Published", in MSI Eureka, Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97, 30.11585.2.2 (2023), http://www.msi-eureka.com/full-html/30.11585.2.2/B- Si Phase Diagrams as Published "Fe-Si Phase Diagrams as Published", in MSI Eureka, Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98, 30.11113.2.6 (2023), http://www.msi-eureka.com/full-html/30.11113.2.6/Fe- Si Phase Diagrams as Published "Fe-Ti Phase Diagrams as Published "Fe-Ti Phase Diagrams as Published", in MSI Eureka, Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96, 30.18458.1.1 (2023), http://www.msi-eureka.com/full-html/30.18458.1.1/Fe- Ti Phase Diagrams as Published

Hf-Pt	"Hf-Pt Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 30.13834.1.4 (2023), <u>http://www.msi-eureka.com/full-html/30.13834.1.4/Hf-</u> <u>Pt_Phase_Diagrams_as_Published</u>
Li-P-S	"Li-P-S Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 95 , 30.18662.1.7 (2023), <u>http://www.msi-eureka.com/full-html/30.18662.1.7/Li-P-</u> <u>S Phase Diagrams as Published</u>
Mo-Ti	"Mo-Ti Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97 , 30.12308.2.4 (2023), <u>http://www.msi-eureka.com/full-html/30.12308.2.4/Mo-</u> <u>Ti Phase Diagrams as Published</u>
Mo-V	"Mo-V Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98 , 30.35418.1.2 (2023), <u>http://www.msi-eureka.com/full-html/30.35418.1.2/Mo-</u> <u>V Phase Diagrams as Published</u>
Mo-Zr	"Mo-Zr Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97 , 30.15394.2.0 (2023), <u>http://www.msi-eureka.com/full-html/30.15394.2.0/Mo-</u> <u>Zr_Phase_Diagrams_as_Published</u>
Ni-V	"Ni-V Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 98 , 30.12016.2.6 (2023), <u>http://www.msi-eureka.com/full-html/30.12016.2.6/Ni-V Phase Diagrams as Published</u>
О-Та	"O-Ta Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97 , 30.11414.2.4 (2023), <u>http://www.msi-eureka.com/full-html/30.11414.2.4/O-</u> <u>Ta Phase Diagrams as Published</u>
O-Ta	"O-Ta Phase Diagrams as Published", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 97 , 30.11414.2.4 (2023), <u>http://www.msi-eureka.com/full-html/30.11414.2.4/O-</u> <u>Ta Phase Diagrams as Published</u>
System	Publications in the Category "Research Results" in MSI Eureka
Fe-Si	Li, X., Liu, S., Du, Y., Turchanin, M., Dreval, L., "Fe-Si Materials Chemistry Research Results", in <i>MSI Eureka</i> , Watson, A. (Ed.) by MSI, Materials Science International Services GmbH, Stuttgart, 96 , 50.11113.4.6 (2023), <u>https://doi.org/10.7121/msi-eureka-50.11113.4.6</u>

Comprehensive platform for materials constitution data

Phase configurations &

Phase transformations with changing temperature, pressure, composition

- phase diagram information
- thermodynamics & kinetics
- crystal structure data
- morphology
- materials properties
- ideal resource of validated input data for Calphad & ab-initio simulations

Inorganic Materials:

Alloys (metals, steels, bronzes, magnets, implants, electronic materials,...& more) Non-metals (ceramics, sensors, semiconductors,... & more) Composites (cermets, ceramic matrix composites, metal matrix composites & more) Unary, binary, ternary & multicomponent systems

Relevant for:

Materials Science Crystallography

Thermodynamics

Materials design

Alloy development

Industrial engineering

entries

across multiple

Crystal growth

Chemistry

industries

Physics

Engineering

MS) EURERA includes

MSIT Documents: full-text database on materials constitution Includes various data categories. "Binary & Ternaty Evaluations", "Diagrams as Published", "Research Results", p-T-x Diagrams"

- 4,645 critical evaluations of binary & ternary systems
- 4,298 extended extracts from literature "Reserach Results"
- 16,500 phase diagrams and graphs
- 10,300 tables, like Crystal Structures, Invariant Reactions, Thermodynamic Properties, Physical Properties, etc.

and continuously updated

Materials World Library "Links to Literature" bibliographic database focused on materials constitution

all materials systems are cross-linked with relevant publications, allows delivery of relevant search results only

benefit from the Materials Ontology approach and find similar materials with one click

- 518,300 bibliographic entries on all inorganic materials ever published, related to
- · 78,700 material systems
- · and continuously updated

MSI EUREKA

MSILEUREKA

Find material properties by combining search criteria: elements + keywords

MSI Eureka is a one-stop platform that offers everything related to materials constitution: from exhaustive bibliography to high-quality evaluated phase diagrams.

The new search interface brings together journal articles with material systems and many other sources of information like conference proceedings, books, theses, case studies, reference handbooks and databases. **78,700** systems with **518,300*** bibliographic citations link material systems and all thier publications, for each individual system!

The bibliographic database "Links to Literature" covers all relevant publications from 1830 up to the present, providing a valuable and constantly growing information source.

* as of May 2024, continuously updated



Advantages of Literature Search in MSI Eureka

MSI Eureka

- intuitive search interface
- finds only relevant information
- publications since 1830 completely covered
- finds materials related to your search (data ontology)

- search
- relevance
- completeness
- value added info
- Other sources
 long complicated
- search phrases
- many irrelevant hits need manual sorting out
- publications before 1960 poorly covered
- no cross-analytics for similar materials

MSI EUREKA

MSI EUREKA

Find data, evaluated, validated and peer-reviewed by MSIT experts. Accessible and optimized for both desktop and mobile devices.

MSIT EVALUATIONS provide critical intellectual evaluations of all data on constitutional properties: phase equilibria, thermodynamic & crystallographic data. Critical evaluation means: where contradictory information is published, data and conclusions are compared and assessed, broken down into firm facts and re-interpreted in the light of all present knowledge. Evaluation Reports are authentic publications, peer reviewed under authorities of MSIT Editorial Board.

Evaluation Reports is an ideal source for computer-aided modeling & simulations, as an input of reliable validated data.



MSI Collaboration Tool

MSIACOLLABORATION is an electronic collaboration environment. It provides project teams with features to track the growth of knowledge whilst working & publishing remotely within their joint projects. The IT system and operational know-how developed for collaborative work and management purposes in numerous MSIT projects, can be provided to the third parties projects. The Collaboration Tool continuously updates the current state of a project and retains all results accessible, also retrospectively. The current state of research in the entire project can be viewed by the project Management as well as by the external coordinators (if required), at any time and can be redefined if necessary. This allows the participants to focus entirely on the scientific work and to jointly produce publications, reports, plan experiments, etc.

It includes the following features:

- a. Purely web-based solution, no special client software required.
- b. Administration of the project-network by "Projects" and Tasks" (Task-e.g. subproject, topic, etc.)
- c. Defining different rights for participants according to missions in the project, e.g. "Task Leader", "Task Members", Reviewers, others.
- d. Allowing participants to develop collaboratively and update documents and research reports in all common formats from distributed locations. Such may be e.g. thermodynamic data files for simulation calculations, publications for journals, reports for the EU, parts of thesis, etc.
- e. Archiving of the collective state of knowledge in the project at the time Z. The tool keeps track of all files, comments and messages and how they belong together. It is the central access point for all co-workers involved in a task.
- f. Other collaboration features (lock files, discontinue, ...)
- g. Documenting cross-project collaborations !

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MSI Graphics Editor

Phase diagrams for MSI Eureka are drawn by the MSIT authors using new software "MSI Graphics Editor", launched by MSI in 2010. The software is developed and designed for researchers and students to easily draw phase equilibria diagrams for binary and ternary systems, as well as other graphs, e.g. p-T, p-x, etc. A number of useful options and tools have been incorporated in this software based on the 36 year's experience of MSI in editing & publishing phase diagrams.





