SpringerMaterials

How a 127 year old handbook has morphed into a web database

Thomas Mager, Springer, 3 December 2010

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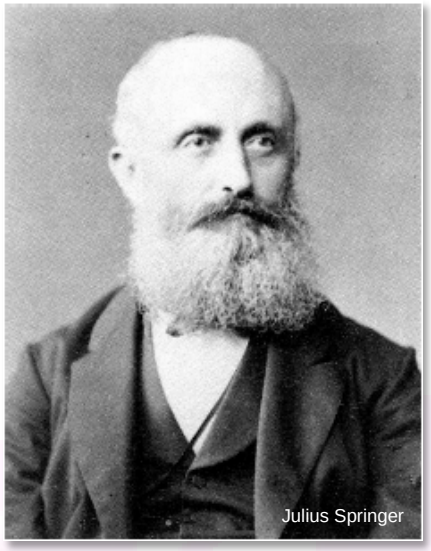
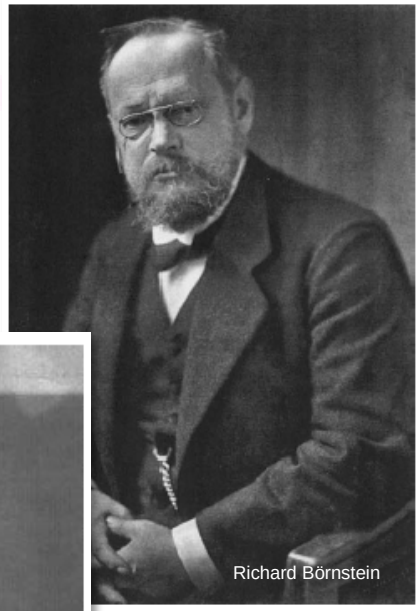
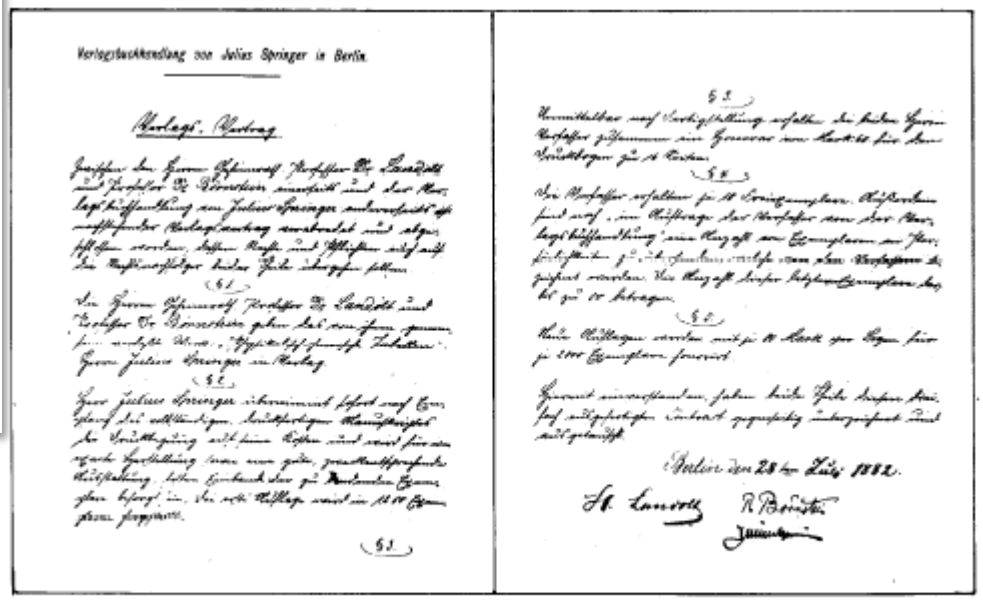

Julius Springer


Richard Börnstein


Hans Landolt


Verlagsbuchhandlung von Julius Springer in Berlin.

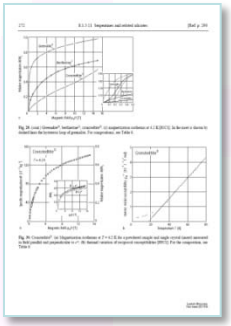
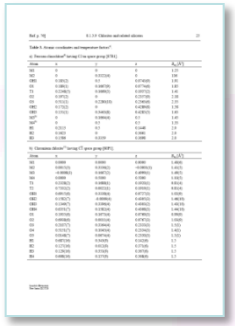
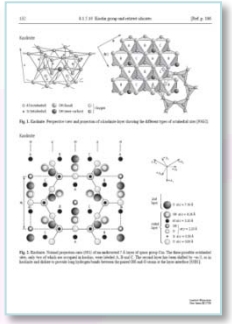
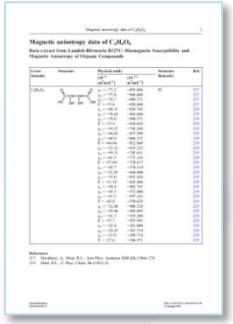
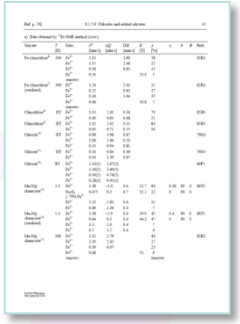
Verlags-Vertrag

Berlin den 28ten Juli 1882.

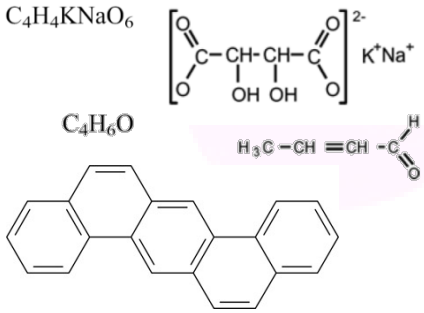
The contract between publisher Julius Springer and the professors Hans Landolt and Richard Börnstein. The five paragraphs contain agreements on the authors' duties (§1), the publisher's duties (§2), the royalty (§3), the free copies (§4), and the royalty for later editions (§5).

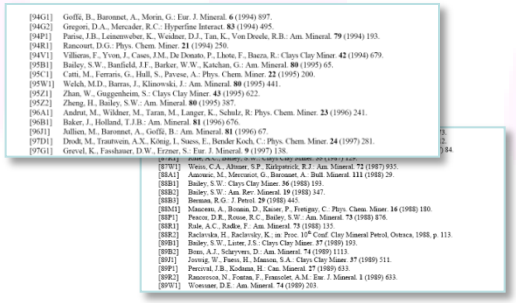
What is Landolt-Börnstein now?

- > 200,000 pages | > 100,000 online documents | > 150,000 figures

- > 250,000 chemical substances | > 1,200,000 literature references





- Systematic and comprehensive evaluation of data by renowned authors and editors (... since 1883)

What is in Landolt-Börnstein?

1	Ar (1)	argon	7440-37-1
	CH_4 (2)	methane	74-82-8

$x_1 = 0.000$ 78M2

T/K	92.0	100.5	110.3	120.0	130.6	151.0	159.5
η /(mPa s)	0.193	0.154	0.123	0.0973	0.0802	0.0515	0.0458

$x_1 = 0.130$ 78M2

T/K	100.0	120.0	140.0
η /(mPa s)	0.174	0.106	0.071

$x_1 = 0.144$ 78M2

T/K	90.0	100.0	110.0	120.0	130.0	140.0
η /(mPa s)	0.224	0.172	0.132	0.105	0.085	0.072

$x_1 = 0.158$ 78M2

T/K	100.1	120.0	140.0
η /(mPa s)	0.170	0.102	0.070

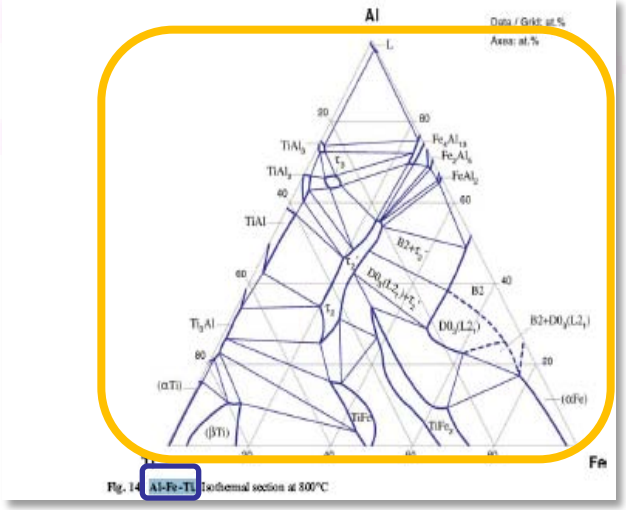


Fig. 14 Al-Fe-Ti. Isothermal section at 800°C

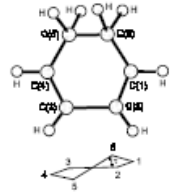
Structure Data of Free Polyatomic Molecules

2269 ED C_6H_8 **1,3-Cyclohexadiene** C_2

r_a	Å [a])	θ_a	deg [a])
C(1)–H	1.09(2)	C(1)=C(2)–C(3)	120.2(8)
C(5)–H	1.10(2)	C(2)=C(1)–C(6)	120.2(8)
C(1)=C(2)	1.349(8)	C(1)–C(6)–C(5)	110.8(8)
C(2)–C(3)	1.466(14)	τ [b])	18.1(10)
C(1)–C(6)	1.521(16)		
C(5)–C(6)	1.536(20)		

The molecule is twisted. The above data are average values of the data from [1] and [2].

[a]) Estimated limits of error, larger than those given in the original paper.
[b]) Effective angle of distortion around the C(2)–C(3) bond.



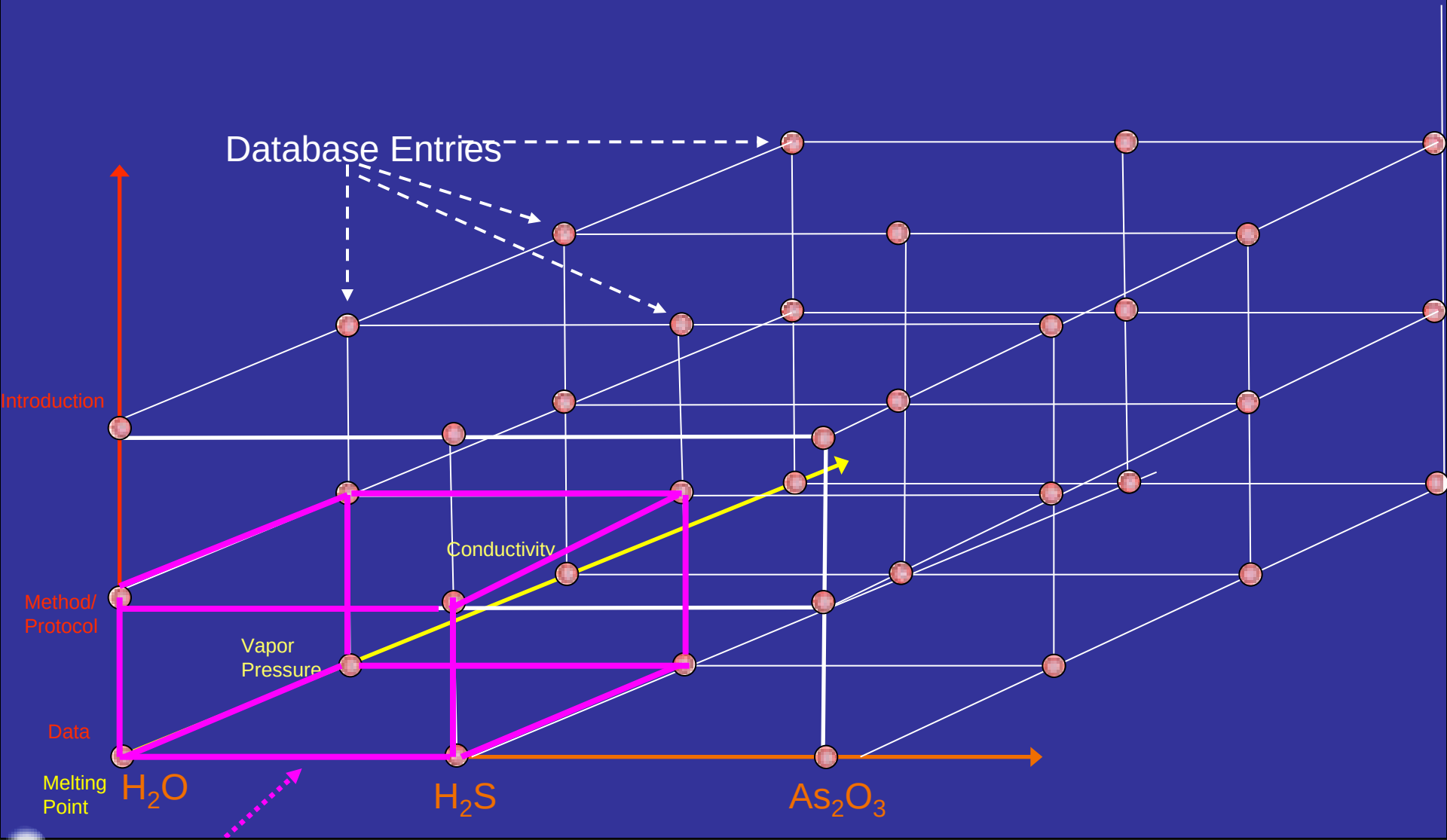
[1] Trætteberg, M.: Acta Chem. Scand. **22** (1968) 2305.
[2] Oberhammer, H., Bauer, S.H.: J. Am. Chem. Soc. **91** (1969) 10.
See also: Dallinga, G., Toneman, L.H.: J. Mol. Struct. **1** (1967) 11.

Chemical Substance

+

Physical Property

Strategy: The SpringerMaterials Database Cube



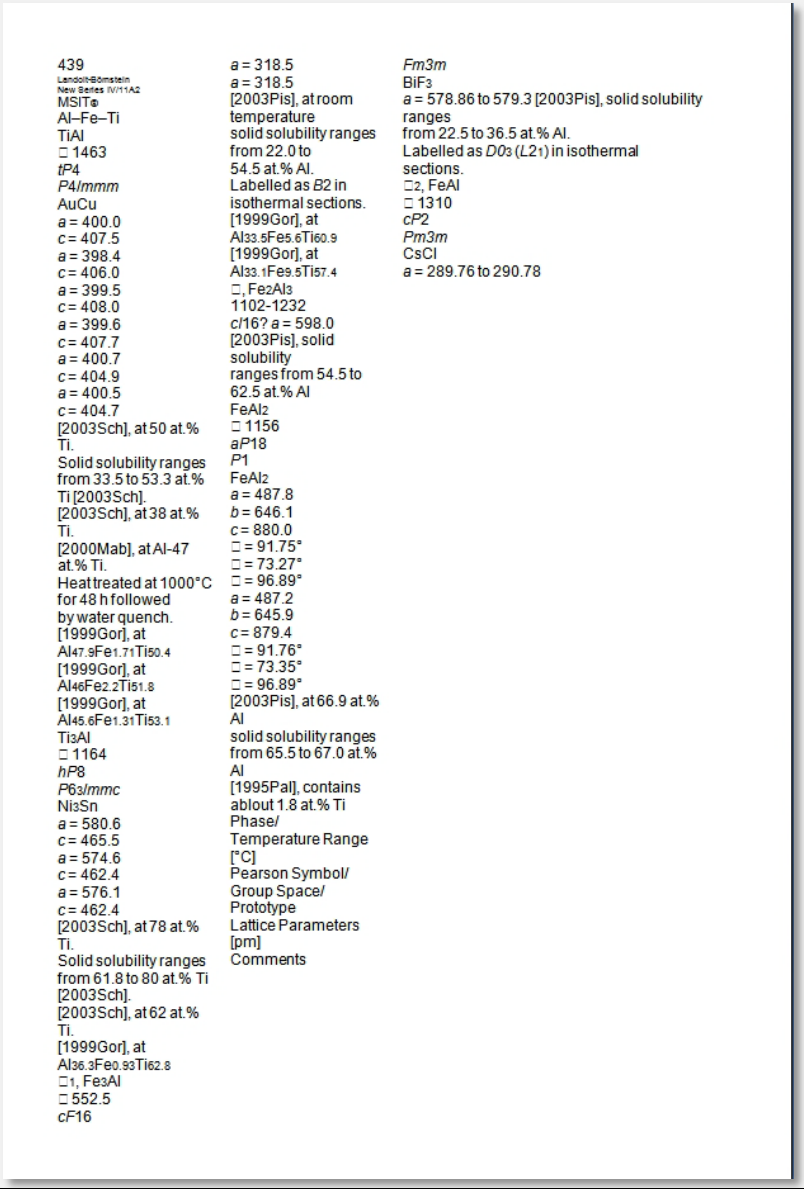
Sub-cube „Thermal properties of chalcogen hydrides“

Phase/ Temperature Range [°C]	Pearson Symbol/ Group Space/ Prototype	Lattice Parameters [pm]	Comments
TiAl	*tP*4	*a* = 400.0	[2003Sch], at 50 at.% Ti.
≤ 1463	*P*4/*mmm*	*c* = 407.5	Solid solubility ranges
	AuCu		from 33.5 to 53.3 at.% Ti [2003Sch].
		a = 398.4	[2003Sch], at 38 at.% Ti.
		c = 406.0	
		a = 399.5	[2000Mab], at Al-47 at.% Ti.
		c = 408.0	Heat treated at 1000°C for 48 h followed by water quench.
		a = 399.6	[1999Gor], at $Al_{47.9}Fe_{1.71}Ti_{50.4}$
		c = 407.7	
		a = 400.7	[1999Gor], at $Al_{46}Fe_{2.2}Ti_{51.8}$
		c = 404.9	
		a = 400.5	[1999Gor], at $Al_{45.6}Fe_{1.31}Ti_{53.1}$
		c = 404.7	
Ti_3Al	*hP*8	*a* = 580.6	[2003Sch], at 78 at.% Ti.
≤ 1164	$P6_3/mmc$	*c* = 465.5	Solid solubility ranges
	Ni_3Sn		from 61.8 to 80 at.% Ti [2003Sch].
		a = 574.6	[2003Sch], at 62 at.% Ti.
		c = 462.4	
		a = 576.1	[1999Gor], at $Al_{36.3}Fe_{0.93}Ti_{62.8}$
		c = 462.4	
α_1, Fe_3Al	*cF*16	*a* = 578.86 to 579.3	[2003Pis], solid solubility ranges
≤ 552.5	$Fm\bar{3}m$		from 22.5 to 36.5 at.% Al.
	BiF_3		Labelled as $D0_3$ ($L2_1$) in isothermal sections.
α_2, FeAl	*cP*2	*a* = 289.76 to 290.78	[2003Pis], at room temperature
≤ 1310	$Pm\bar{3}m$		solid solubility ranges from 22.0 to 54.5 at.% Al.
	CsCl		Labelled as *B*2 in isothermal sections.
		a = 318.5	[1999Gor], at $Al_{33.5}Fe_{5.6}Ti_{60.9}$
		a = 318.5	[1999Gor], at $Al_{33.1}Fe_{9.5}Ti_{57.4}$
ε, Fe_2Al_3	*cI*16?	*a* = 598.0	[2003Pis], solid solubility
1102-1232			ranges from 54.5 to 62.5 at.% Al
$FeAl_2$	*aP*18	*a* = 487.8	[2003Pis], at 66.9 at.% Al
≤ 1156	*P*1	*b* = 646.1	solid solubility ranges
	$FeAl_2$	*c* = 880.0	from 65.5 to 67.0 at.% Al
		α = 91.75°	
		β = 73.27°	
		γ = 96.89°	
		a = 487.2	[1995Pal], contains ablout 1.8 at.% Ti
		b = 645.9	
		c = 879.4	
		α = 91.76°	
		β = 73.35°	
		γ = 96.89°	

Each Document Comprises Three Layers

Layer 1

What the User Can See



439
Landolt-Börnstein
New Series IV/11A2
MSIT®
Al–Fe–Ti
TiAl
□ 1463
*tP*4
*P*4/*mmm*
AuCu
a = 400.0
c = 407.5
a = 398.4
c = 406.0
a = 399.5
c = 408.0
a = 399.6
c = 407.7
a = 400.7
c = 404.9
a = 400.5
c = 404.7
[2003Sch], at 50 at.% Ti.
Solid solubility ranges from 33.5 to 53.3 at.% Ti [2003Sch].
[2003Sch], at 38 at.% Ti.
[2000Mab], at Al-47 at.% Ti.
Heat treated at 1000°C for 48 h followed by water quench.
[1999Gor], at $Al_{47.9}Fe_{1.71}Ti_{50.4}$
[1999Gor], at $Al_{46}Fe_{2.2}Ti_{51.8}$
[1999Gor], at $Al_{45.6}Fe_{1.31}Ti_{53.1}$
Ti_3Al
□ 1164
*hP*8
*P*6$_3$/*mmc*
Ni_3Sn
a = 580.6
c = 465.5
a = 574.6
c = 462.4
a = 576.1
c = 462.4
[2003Sch], at 78 at.% Ti.
Solid solubility ranges from 61.8 to 80 at.% Ti [2003Sch].
[2003Sch], at 62 at.% Ti.
[1999Gor], at $Al_{36.3}Fe_{0.93}Ti_{62.8}$
□$_1$, Fe_3Al
□ 552.5
*cF*16
a = 318.5
a = 318.5
[2003Pis], at room temperature solid solubility ranges from 22.0 to 54.5 at.% Al.
Labelled as *B*2 in isothermal sections.
[1999Gor], at $Al_{33.5}Fe_{5.6}Ti_{60.9}$
[1999Gor], at $Al_{33.1}Fe_{9.5}Ti_{57.4}$
□, Fe_2Al_3
1102-1232
c/16? *a* = 598.0
[2003Pis], solid solubility ranges from 54.5 to 62.5 at.% Al
$FeAl_2$
□ 1156
*aP*18
*P*1
$FeAl_2$
a = 487.8
b = 646.1
c = 880.0
□ = 91.75°
□ = 73.27°
□ = 96.89°
a = 487.2
b = 645.9
c = 879.4
□ = 91.76°
□ = 73.35°
□ = 96.89°
[2003Pis], at 66.9 at.% Al
solid solubility ranges from 65.5 to 67.0 at.% Al
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Phase/ Temperature Range [°C]
Pearson Symbol/ Group Space/ Prototype
Lattice Parameters [pm]
Comments
*Fm*3*m*
BiF_3
a = 578.86 to 579.3 [2003Pis], solid solubility ranges from 22.5 to 36.5 at.% Al.
Labelled as *D*0$_3$ (*L*2$_1$) in isothermal sections.
□$_2$, FeAl
□ 1310
*cP*2
*Pm*3*m*
CsCl
a = 289.76 to 290.78

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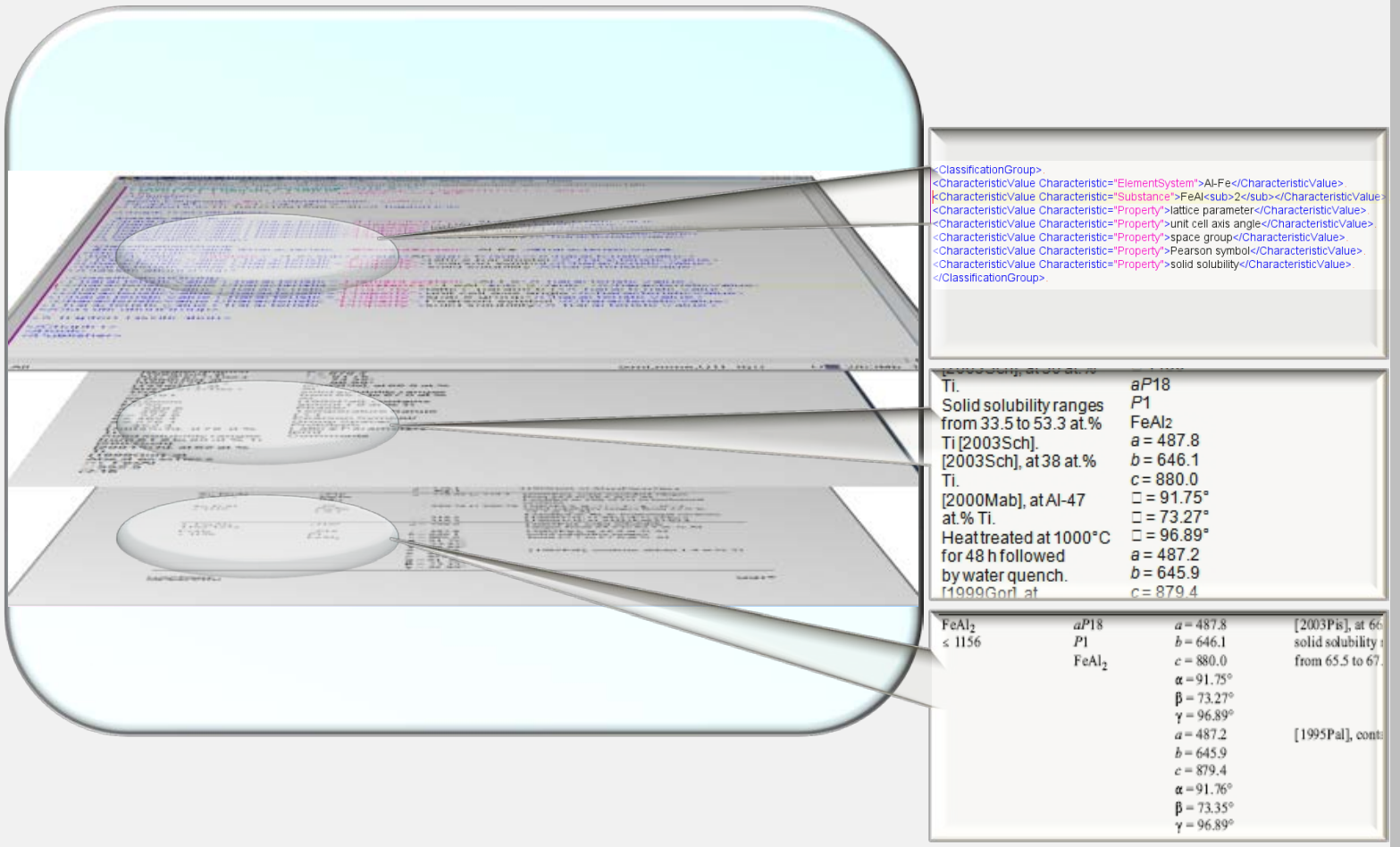

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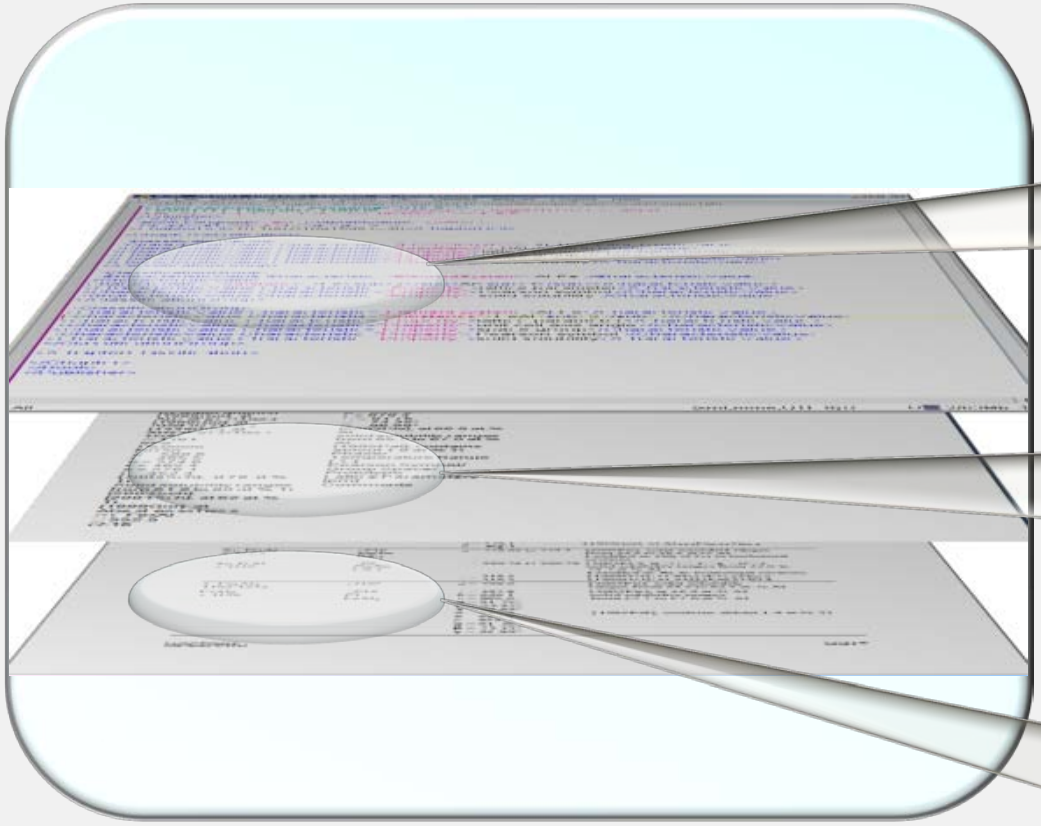
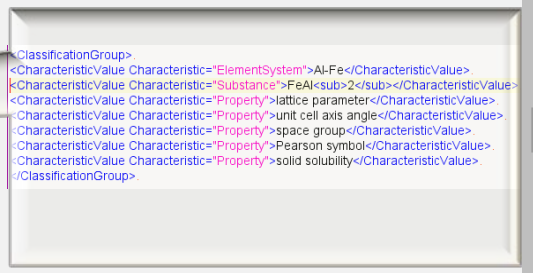
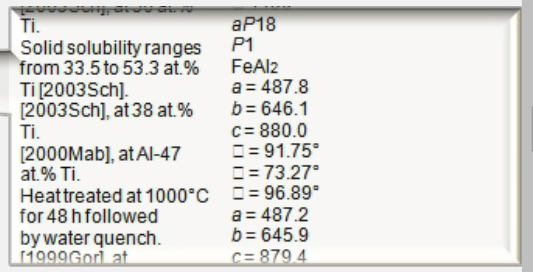
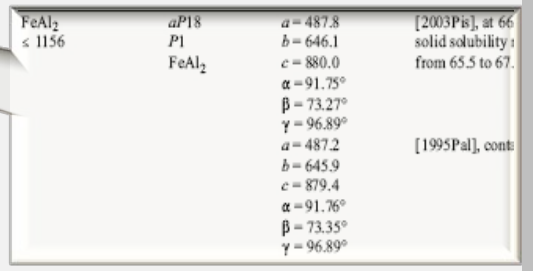
A Closer Look

Index









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Summary

A Closer Look

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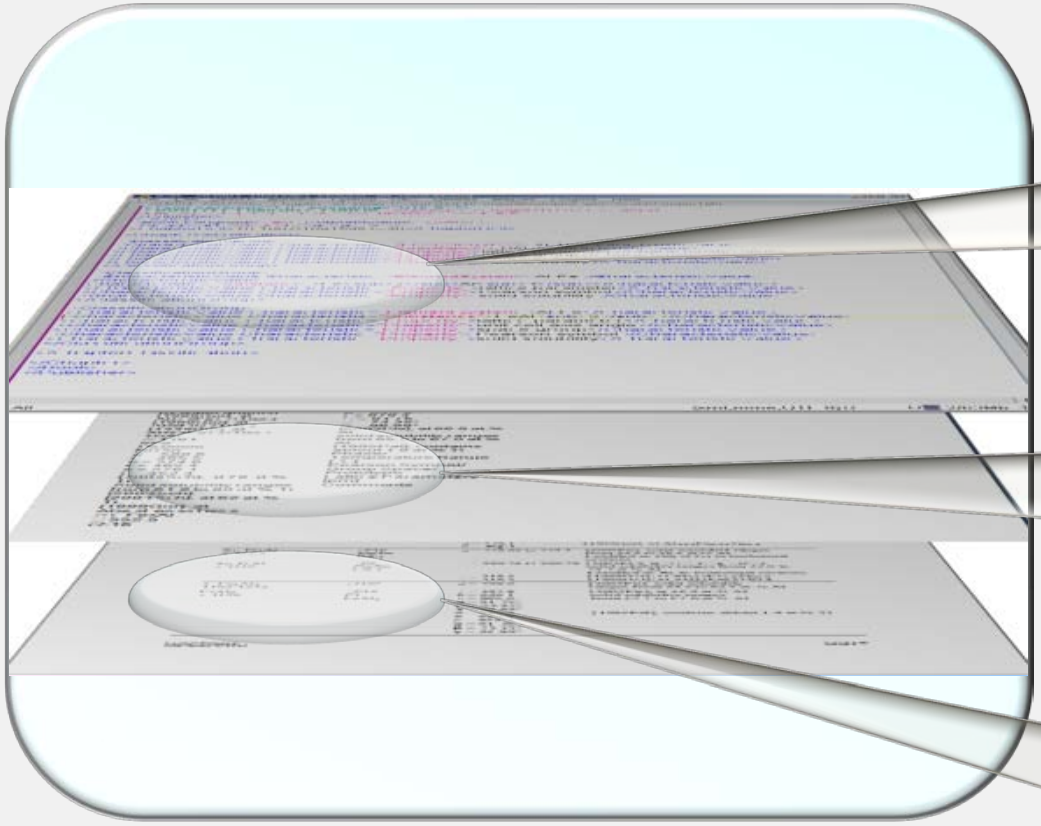

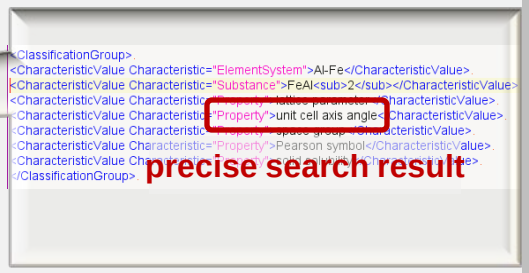

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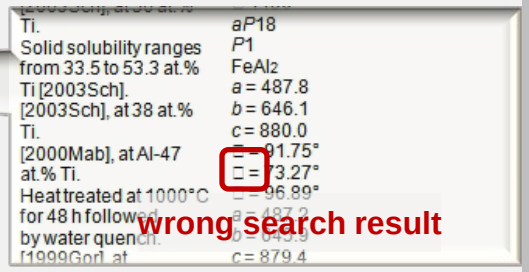

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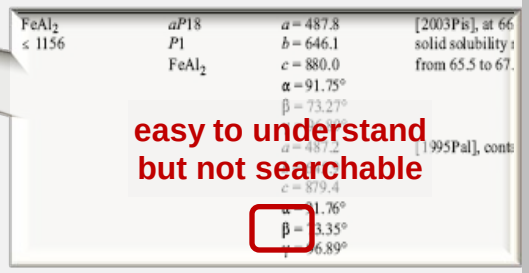

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0 Astro- and Geophysics

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1 2 next

Multiphase Systems > Ternary Alloys > Phase Diagrams, Aluminum (Al-X-Y) Ternary Alloys

Al-Fe-Ti

Metadata: ...Al-Fe-Ti; Aluminium - Iron - Titanium; Aluminium – I
Metadata: Al-Fe-Ti....

Multiphase Systems > Ternary Alloys > Phase Diagrams, Systems: Selected Systems from Al-B-Fe to C-Co-Fe

Aluminium – Iron – Titanium

Metadata: ...Al-Fe-Ti; Aluminium - Iron - Titanium; Aluminium – I
Metadata: ...Al-Fe-Ti....

Multiphase Systems > Ternary Alloys > Phase Diagrams, Title Pages, Contributors, Preface, and Contents

Part 2

...Systems from Al-Cu-Fe to Al-Fe-Ti Editor G. Effenberg Authors I

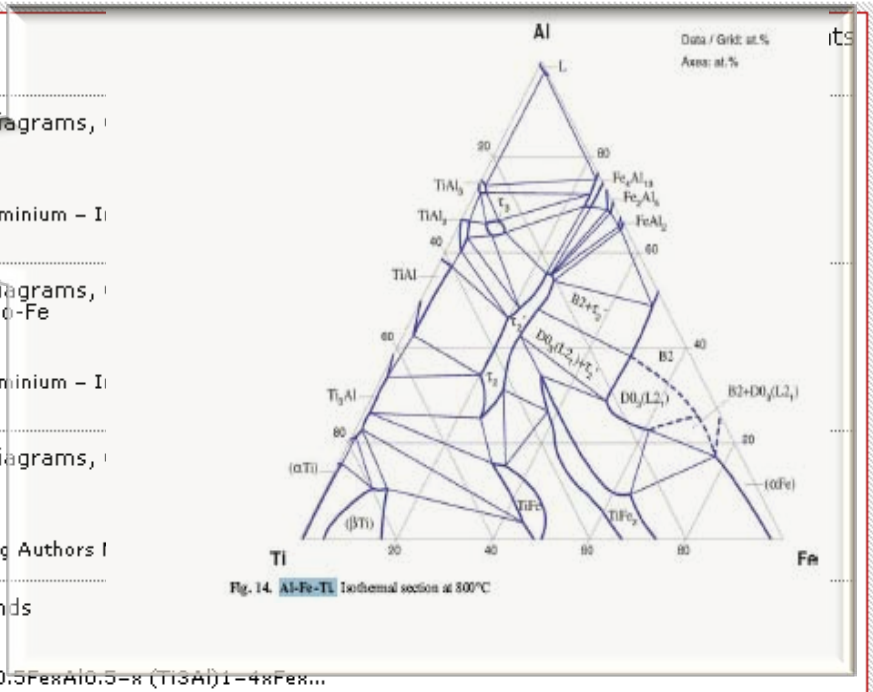

Fig. 14. Al-Fe-Ti Isothermal section at 800°C

Magnetism > Actinides > Elements and Compounds

Index of substances

...Al-Fe-Th ThFe4Al8 Al-Fe-Ti FeTixAl1−x Ti-Fe-Al Ti0.5FexAl0.5−x (Ti3Al)1−4xFex...

Multiphase Systems > Ternary Alloys > Phase Diagrams, Crystallography and Thermodynamics > Light Metal Systems > Aluminum (Al-X-Y) Ternary Alloys

Al-Co-Ti

...to be similar to the Al-Fe-Ti system, assessed in the same paper and...

Multiphase Systems > Ternary Alloys > Phase Diagrams, Crystallography and Thermodynamics > Light Metal Systems > Title Pages, Contributors, Preface, and Contents

Part 1

...Systems from Al-Cu-Fe to Al-Fe-Ti Part 2 Selected Systems from Al-Fe-V...

Magnetism > Transition Metals > Alloys and Compounds with Main Group Elements > Magnetic properties of 3d, 4d and 5d elements, alloys and compounds > Alloys and compounds of 3d elements with main group elements > 3d elements and B,

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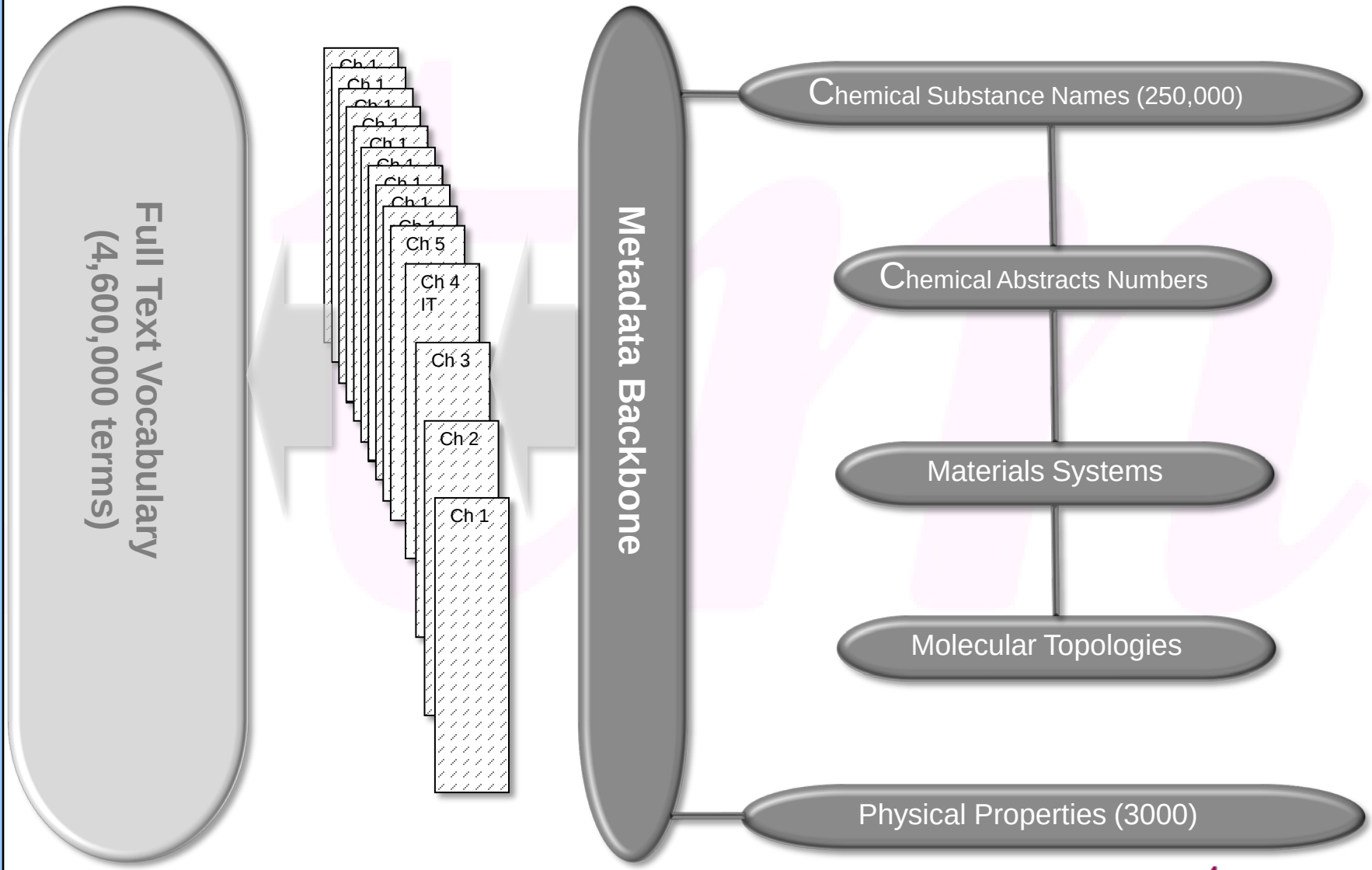

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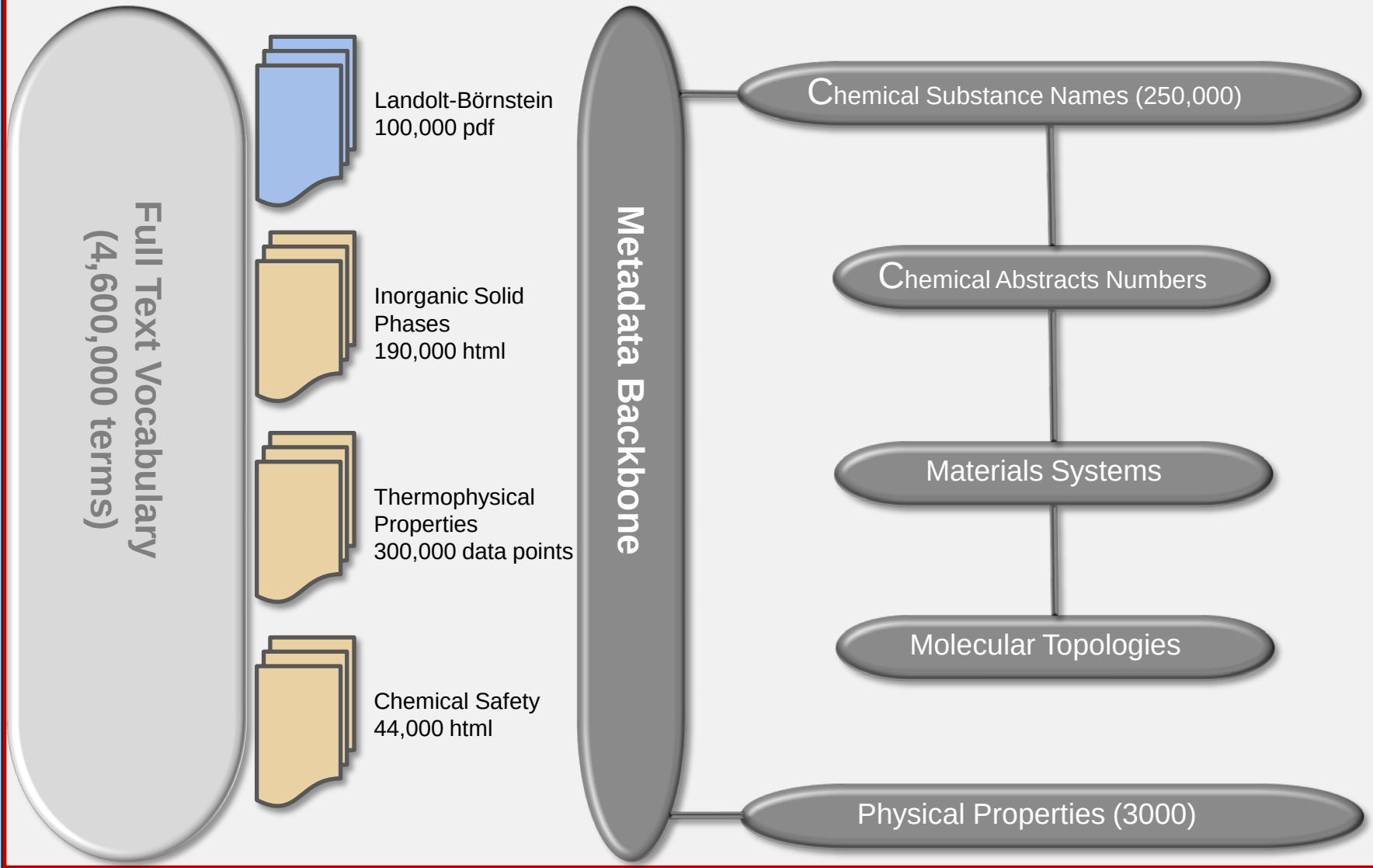

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+++ what's new +++ what's new +++ what's new +++ what's new +++ what's new +++ what's new +++

Available September 30, 2010

- Database on Thermophysical Properties: New Data added (more ...)
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- Wildcard Search (more ...)
- Citation Export (more ...)

News archive

- Al-Fe-Ti
- Al-Fe-H-Ti
- Al-Fe-Nd-Ti
- Al-Fe-Ni-Ti
- Al-Fe-O-Ti
- Al-Fe-Ti-V
- Al-B-Fe-Ni-Ti
- Al-Ba-Fe-O-Ti
- Al-Cr-Fe-O-Ti
- Al-Fe-Mg-O-Ti
- Al-Fe-Na-O-Ti
- Al-Fe-O-Si-Ti
- Al-Fe-Pr-Sm-Ti
- Al-B-Fe-Mg-O-Ti
- Al-Ca-Fe-Mg-Mn-Ti
- Al-Ca-Fe-O-Si-Ti
- Al-Ca-Fe-O-Ti-Zr
- Al-Ce-Fe-O-Si-Ti
- Al-Co-Cu-Fe-Ni-Ti
- Al-Cr-Fe-Mg-O-Ti
- Al-Cr-Fe-Nb-Ni-Ti
- Al-Fe-H-O-Si-Ti
- Al-Fe-H-O-Ti-V
- Al-Fe-Mg-O-Si-Ti
- Al-Fe-Mn-O-Pb-Ti
- Al-Fe-Mo-O-Sr-Ti
- Al-Fe-Nd-O-Si-Ti
- Al-Fe-Nd-O-Ti-Zn

< previous Page 1 of 12 next >

Search for Element Systems

Select elements by clicking on the symbols.
Deselect elements by clicking a second time.

Your Selection
Al-Fe-Ti

	1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8 VIIIB	9 VIIIB	10 VIIIB	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA	
1	1 H	1 D	1 T															2 He	K
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne	L
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	M
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	N
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	O
6	55 Cs	56 Ba	*	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	P
7	87 Fr	88 Ra	**	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113	114	115	116	117	118	Q

*	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
**	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

0 Particles, Nuclei and Atoms
0 Molecules and Radicals
0 Electronic Structure and Transport
6 Magnetism
0 Semiconductivity
0 Superconductivity
0 Crystallography
0 Thermodynamics
5 Multiphase Systems
0 Advanced Materials
0 Advanced Technologies
0 Astro- and Geophysics

4 Inorganic Solid Phases
0 Thermophysical Properties

0 Chemical Safety

Results 1 - 10 of 15 Documents previous 1 2 next

Compact View | Clear | Refine

Multiphase Systems > Ternary Alloys > Phase Diagrams, Crystallography and Thermodynamics > Light Metal Systems > Aluminum (Al-X-Y) Ternary Alloys

Al-Fe-Ti

Metadata - Substance: **Al-Fe-Ti** ... **Al-Fe-Ti** (Aluminium - Iron - Titanium) ... **Metadata - Property:** **phase diagram** ... thermodynamic **phase** ... **Metadata - Element System:** **Al-Fe-Ti** ... **Metadata - Keyword:** **Phase** Equilibria ... **Fulltext:** E., "The Equilibrium **Diagram** of the **Al-Fe-Ti** System and ... 10, 339-343 (1940) (Equi. **Diagram**, Experimental, #, *, 5) ... AD-43730, 1-72 (1954) (Equi. **Diagram**, Experimental, #, *) Bok, ...

Multiphase Systems > Ternary Alloys > Phase Diagrams, Crystallography and Thermodynamics > Iron Systems > Selected Systems from Al-B-Fe to C-Co-Fe

Aluminium-Iron-Titanium

Metadata - Substance: **Al-Fe-Ti** ... **Al-Fe-Ti** (Aluminium - Iron - Titanium) ... **Metadata - Property:** **phase diagram** ... **Metadata - Element System:** **Al-Fe-Ti** ... **Metadata - Keyword:** solid **phase** ... solid **phases** ... **Fulltext:** carried out to determine the **phase** equilibria. Earlier ... Thermal analysis and **phase** analysis by X-ray diffraction ... only a brief review of the **phase** equilibria. [1987Men] ...

Inorganic Solid Phases

Al-Fe-Ti, ternary phase diagram, isothermal section

Metadata - Property: **phase diagram** ... **Metadata - Element System:** **Al-Fe-Ti** ... **Fulltext:** **Al-Fe-Ti**, ternary **phase diagram**, ... section Element System: **Al-Fe-Ti** Inorganic Solid **Phases** · **phase diagrams** **Diagram** details: Al conc.[0-50 at.%] ... vs. Ti conc.[50-100 at.%] **Phase Diagram** C975737 from: Seibold A., ... Metallkd. 72 (1981) 712–719. **Diagram** details: Al conc.[0-30 wt.%] ...

Inorganic Solid Phases

Al-Fe-Ti, ternary phase diagram, vertical section

Metadata - Property: **phase diagram** ... **Metadata - Element System:** **Al-Fe-Ti** ... **Fulltext:** **Al-Fe-Ti**, ternary **phase diagram**, ... Solid **Phases** · **phase diagrams** **Diagram** details: T[400-1800 °C] vs. ...

Inorganic Solid Phases

Al-Fe-Ti, ternary phase diagram, liquidus projection

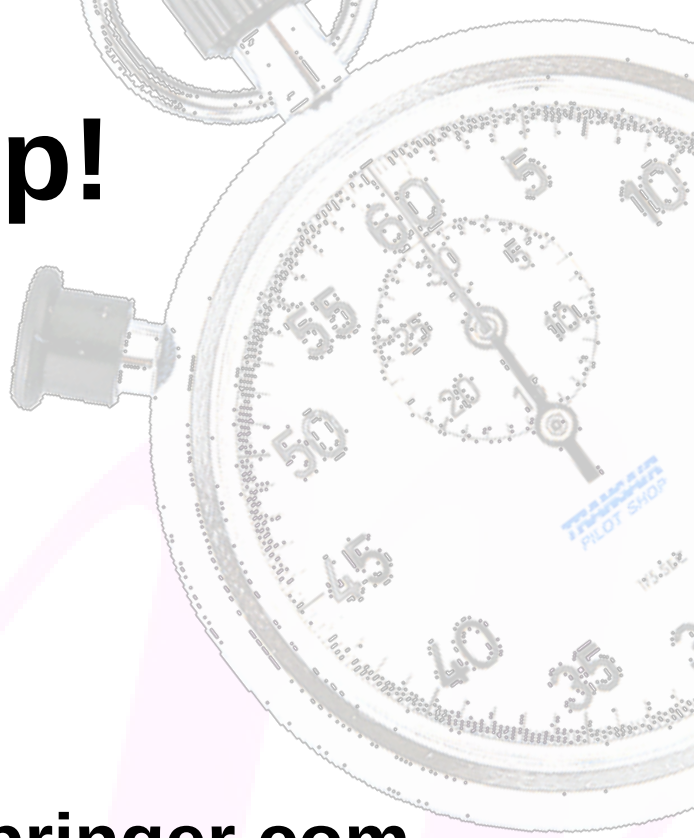
Metadata - Property: **phase diagram** ... **Metadata - Element System:** **Al-Fe-Ti** ... **Fulltext:** **Al-Fe-Ti**, ternary **phase diagram**, ... Solid **Phases** · **phase diagrams** **Diagram** details: Al conc.[0-100 at.%] ...

Inorganic Solid Phases

Al-Ti, binary phase diagram

Metadata - Property: **phase diagram** ... **Fulltext:** Al-Ti, binary **phase diagram** Element System: Al-Ti ... Solid **Phases** · **phase diagrams** **Diagram**

Time’s Up!



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