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Rainer Münz
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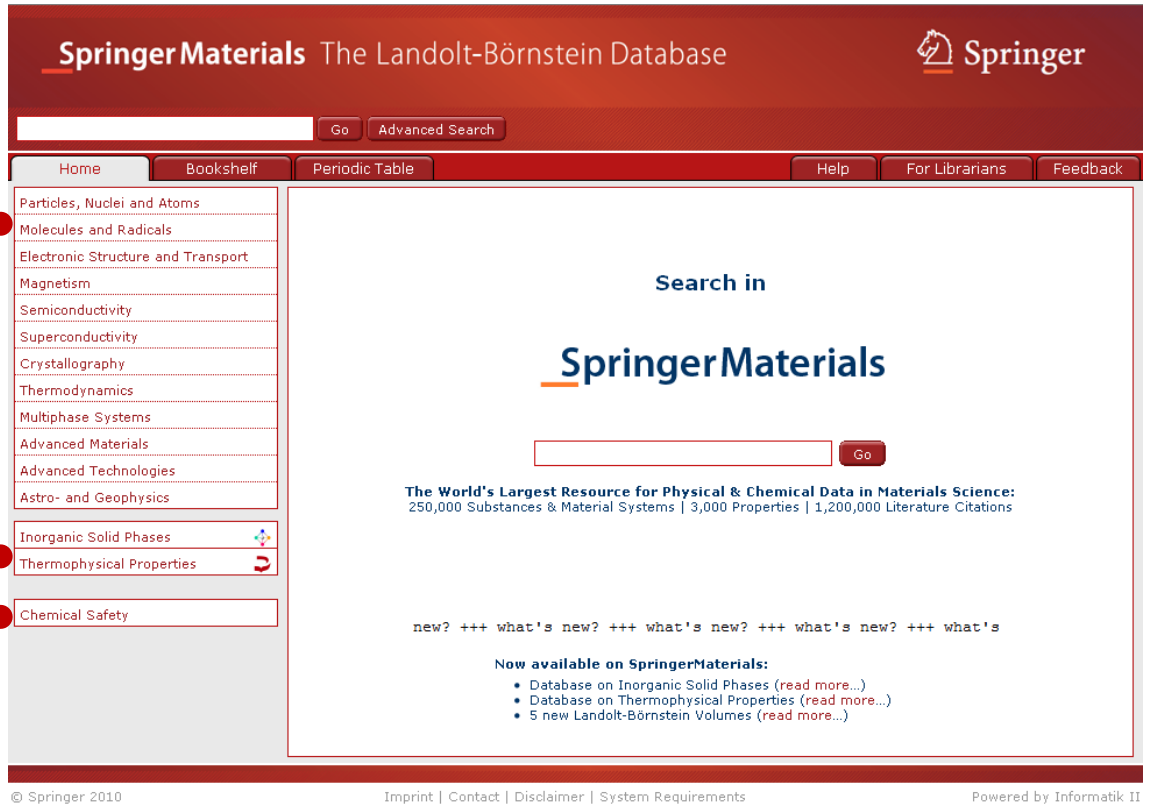

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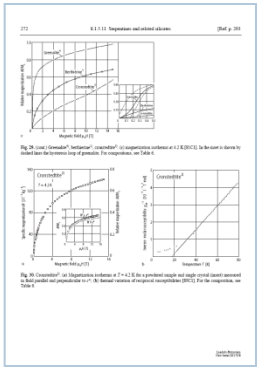
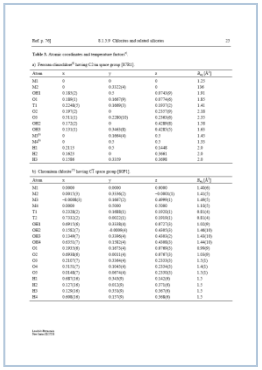
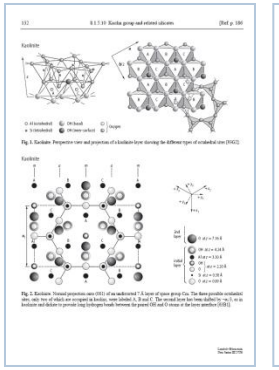
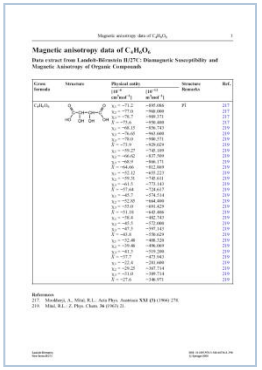
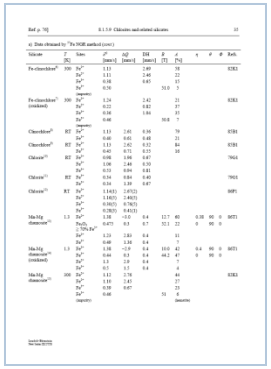

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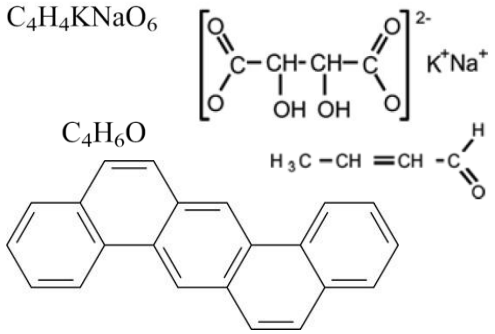

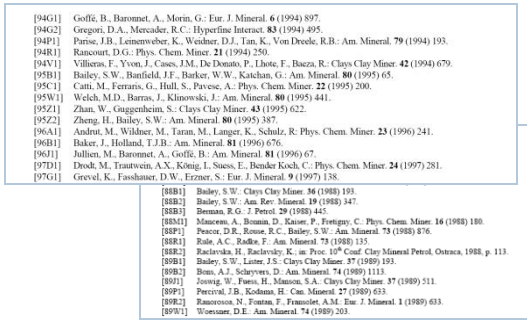
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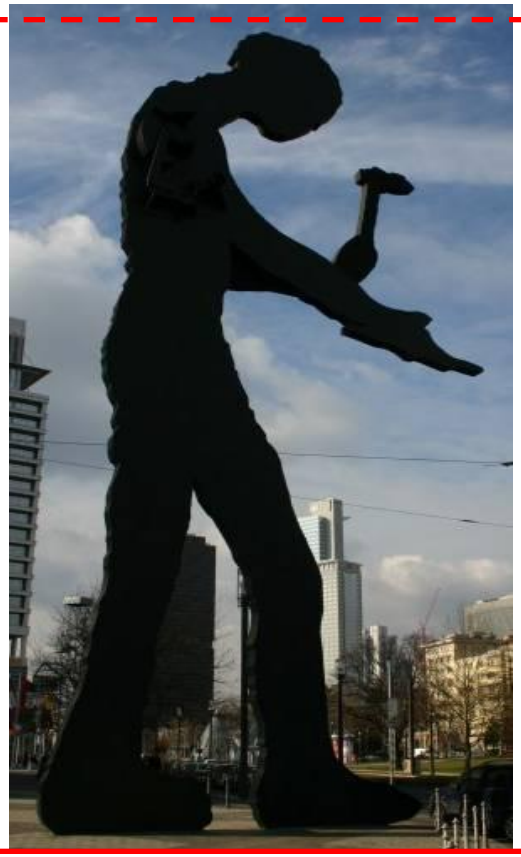

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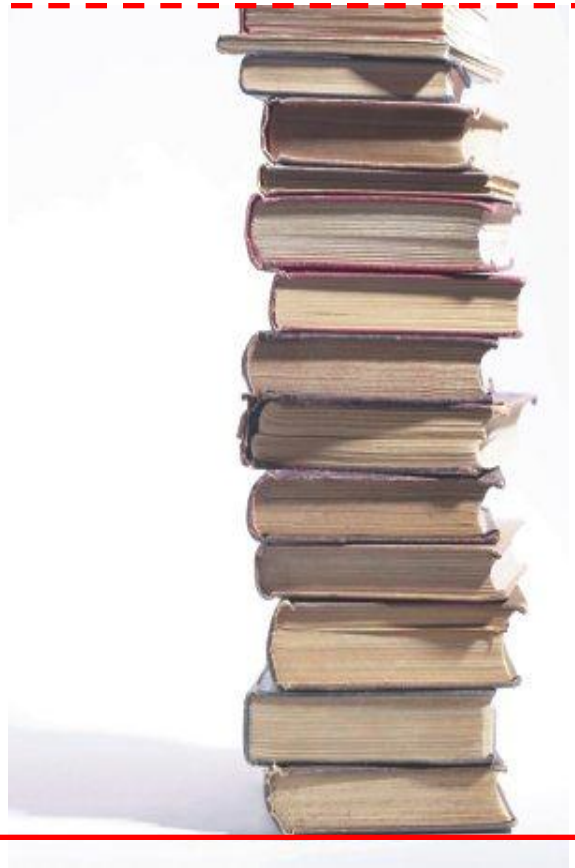

What does “critically evaluated” mean?

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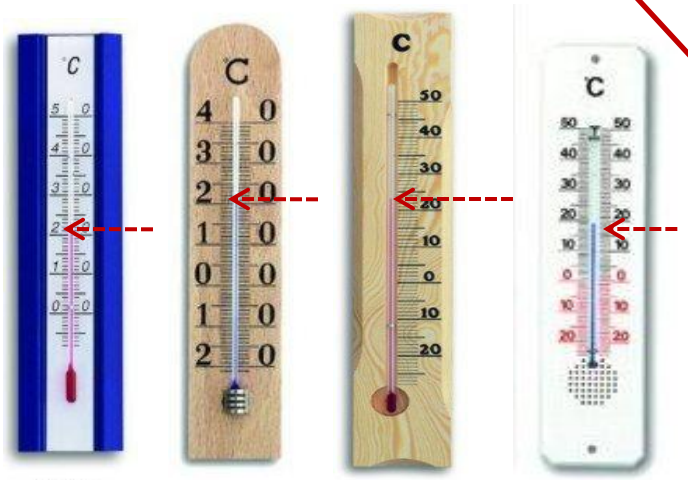
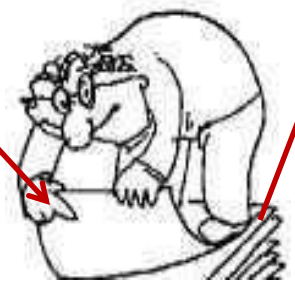
Temperature measurements





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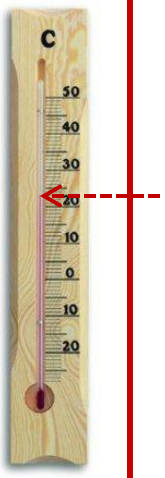

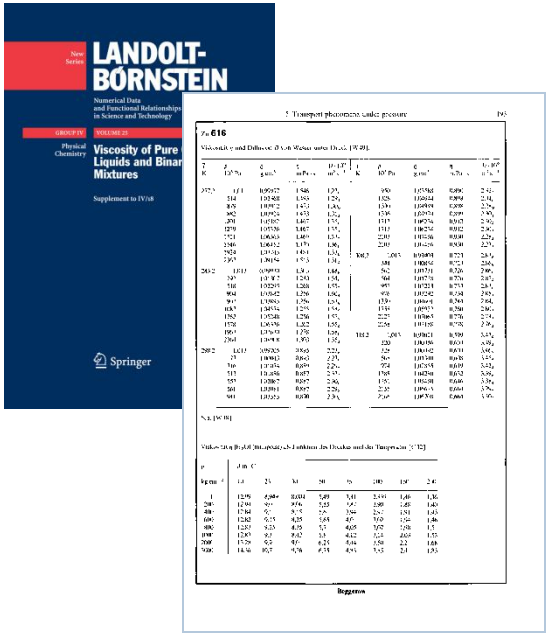

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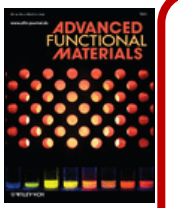

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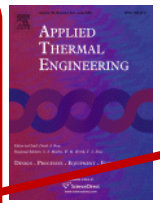

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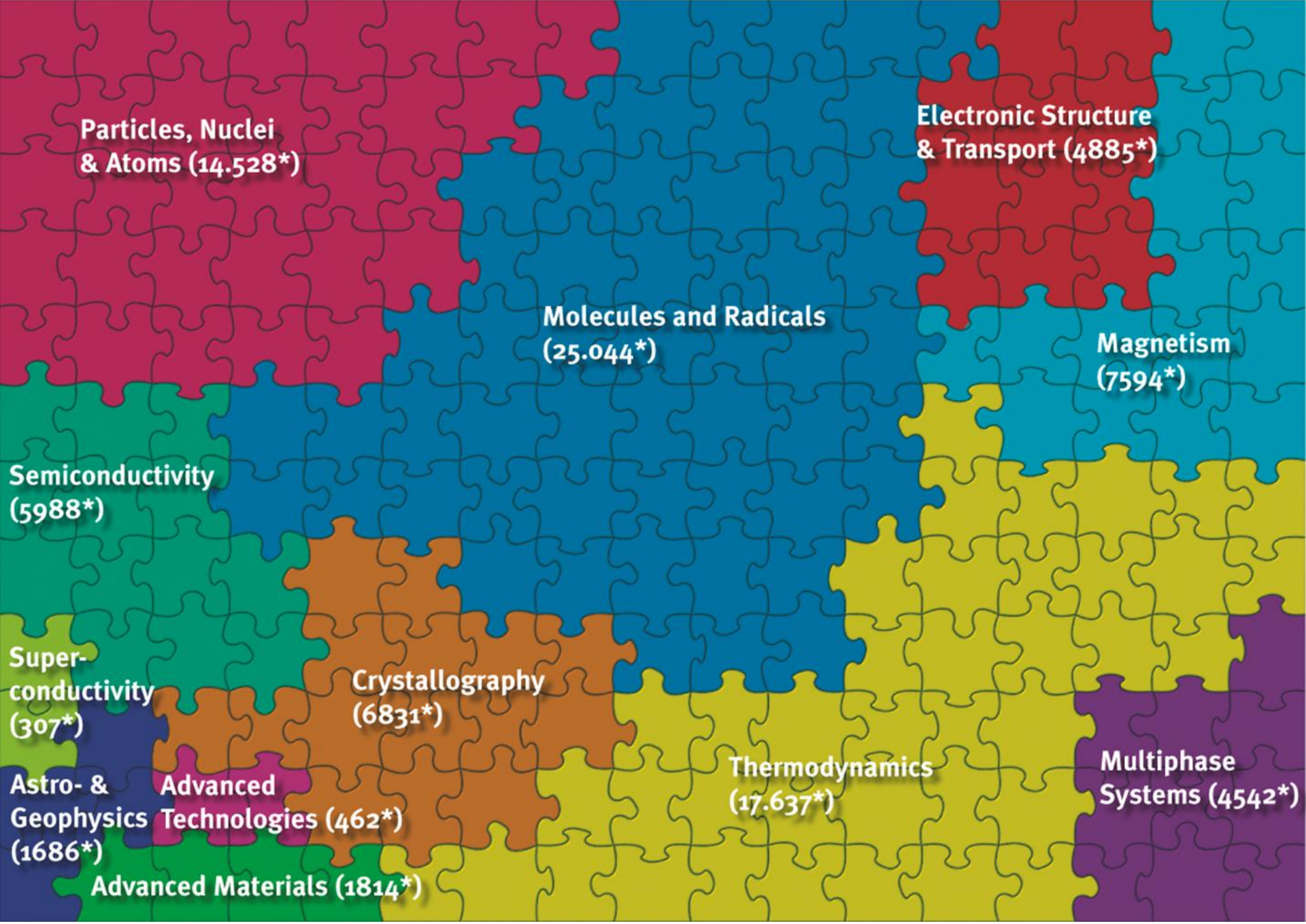

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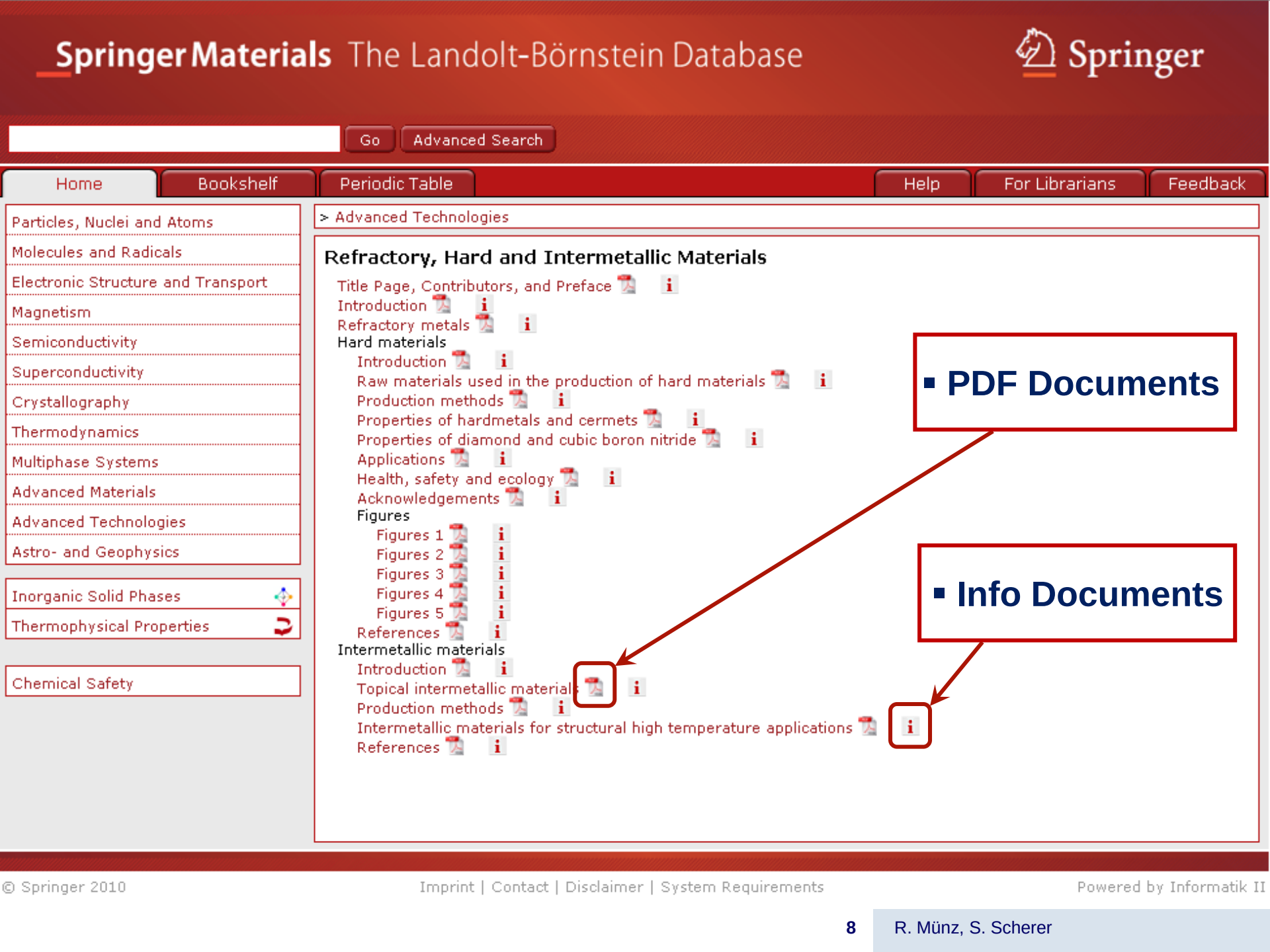
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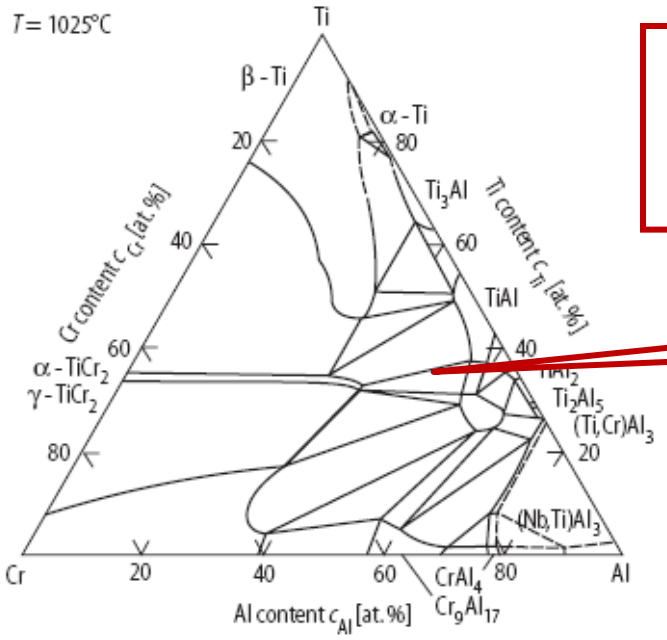

Fig. 14.4. Isothermal section of the Ti-Al-Cr phase diagram at 1025 °C [97P1] - see also [97X1, 98H3].

Text

14.4.2.2 Ti_3Al-base alloys

14.4.2.2.1 Compositions and applications

Various Ti_3Al-base alloys have been developed which contain niobium as major alloying element and further elements for obtaining an optimised balance of strength, deformability, toughness and oxidation resistance. The alloys are two-phase or three-phase and contain additional phases besides the phase Ti_3Al, which is known as the α_2 phase. The usual additional phases are the β phase, which is Ti-rich and which has the b.c.c. structure or is ordered with B2 structure, the orthorhombic phase Ti_2AlNb, and/or the ω-type phase Ti_4Al_3Nb with $B8_2$ structure [92B1, 95B]. In addition, ... have been used as matrices for intermetallic matrix composites, which rely primarily on the SiC fibre SCS-6 [92L]. Current Ti_3Al-base alloys with engineering significance are listed in Table 6.

Tables

Table 6. Important Ti_3Al-base alloys [92B1, 95B].

Type	Alloy [at.%]	Designation	Phases
α_2	Ti-24Al-11Nb	24-11	$\alpha_2 + \beta$
α_2	Ti-25Al-11Nb	25-11	$\alpha_2 + \beta$

Bibliographic Information for 10.1007/10858641_18

Cite as:

Sauthoff, G.: *14.4 Intermetallic materials for structural high temperature applications*. Beiss, P., Ruthardt, R., Warlimont, H. (ed.). SpringerMaterials - The Landolt-Börnstein Database (http://www.springermaterials.com). DOI: 10.1007/10858641_18

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Database on Inorganic Solid

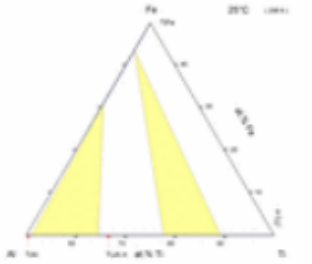
"Linus Pauling File"

- **Physical Properties**
  (44,000 Data Sheets)
- **Structure/Diffraction Data**
  (123,000 Data Sheets)
- **Phase Diagrams**
  (23,000 Data Sheets)

Al-Fe-Ti, ternary phase diagram, isothermal section
Element System: Al-Fe-Ti

Inorganic Solid Phases · phase diagrams

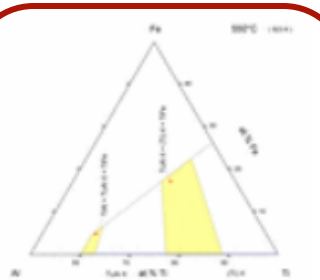
Diagram details: Al conc.[0-50 at.%] vs. Fe conc.[0-50 at.%] vs. Ti conc.[50-100 at.%]



Phase Diagram C975737

from:
Seibold A., Seibold A., Seibold A., Seibold A.: "Phasengleichgewichte in den ternären Systemen Ti-Fe-O und Ti-Al-Fe", Z. Metallkd. **72** (1981) 712-719.

Diagram details: Al conc.[0-30 wt.%] vs. Fe conc.[0-30 wt.%] vs. Ti conc.[70-100 wt.%]



Phase Diagram C975734

from:
Volkova M.A., Kornilov I.I.: "PHASE EQUILIBRIUM IN TITANIUM-RICH Ti-Al-Fe ALLOYS", Russ. Metall. 3 (1970) 134-137.

Diagram details: Al conc.[0-45 at.%] vs. Fe conc.[0-27 at.%] vs. Ti conc.[55-100 at.%]

„Inorganic Solid Phases“: Overview of Relevant Data Sheets

Element System: Al-Fe-Ti
Ternary Phase Diagram
Investigated Concentration Ranges: Al conc.[0-50 at.%] vs. Fe conc.[0-50 at.%] vs. Ti conc.[50-100 at.%]

Constitution Entry Summary

System	Al-Fe-Ti
Diagram Type	ternary, isothermal section
Concentration Range	partial composition; Ti-TiAl-TiFe / 50-100 at.% Ti
Temperature	298 K
Investigation	experimental
APDIC	non-APDIC

Reference

Seibold A.: "Phasengleichgewichte in den ternären Systemen Ti-Fe-O und Ti-Al-Fe", Z. Metallkd. **72** (1981) 712-719.

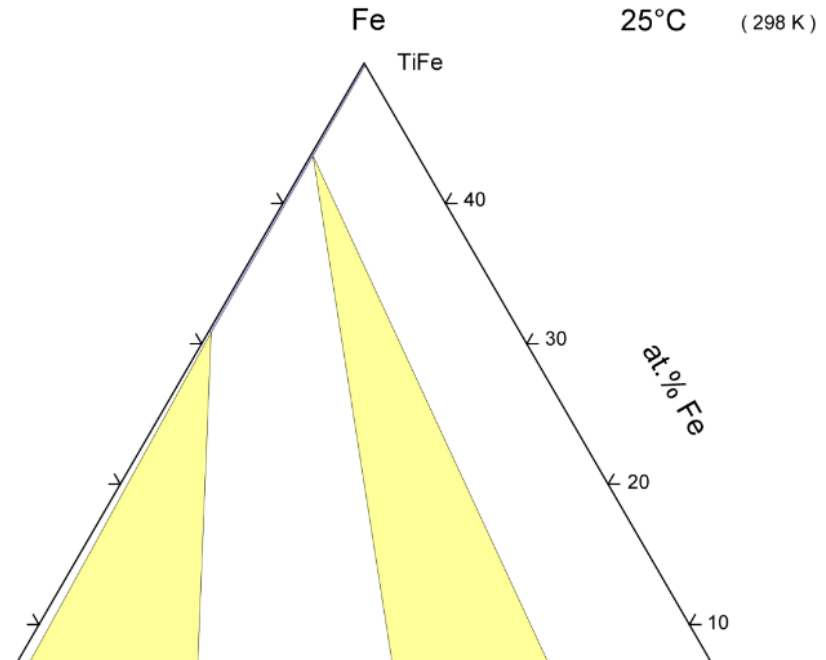
Phase Diagram

Published Phase Diagram

Figure	19
Title	Al-Fe-Ti isothermal section at 25 °C
Parameters	Al conc.[0-50 at.%] vs. Fe conc.[0-50 at.%] vs. Ti conc.[50-100 at.%]

Redrawn Phase Diagram

Concentration range	partial composition; Ti-TiAl-TiFe
Enlargement	0.6



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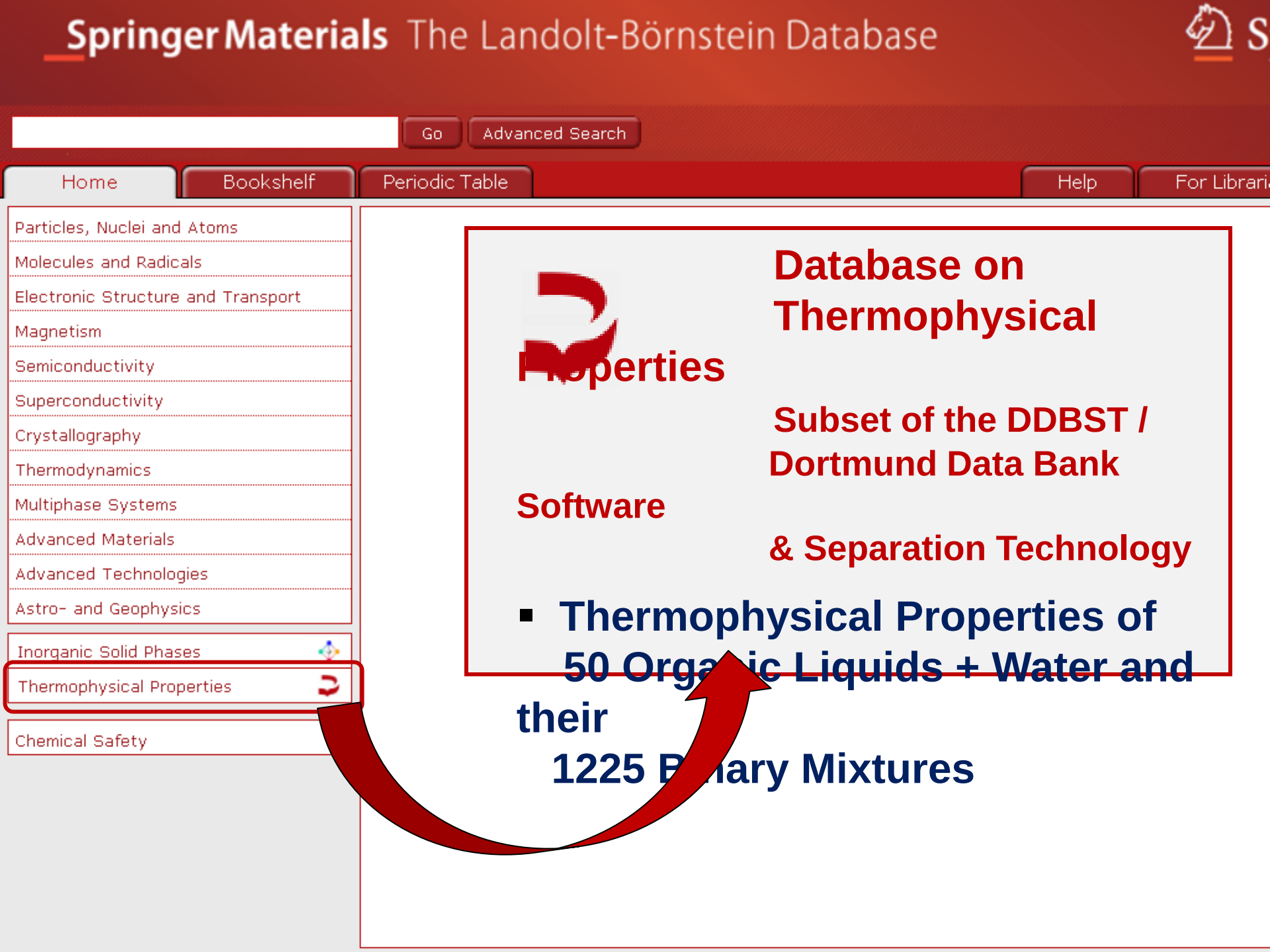
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Methanol / Water

Thermophysical Data in the Dortmund Data Bank

Components

No.	Formula	Molar Mass	CAS Registry Number	Name
1	CH_4O	32.042	67-56-1	Methanol
2	H_2O	18.015	7732-18-5	Water

List of Available Properties

- Activity Coefficients at Infinite Dilution
- Azeotropic Data
- Excess Heat Capacities
- Heat Capacities
- Excess Enthalpies
- Solid-Liquid Equilibria
- Excess Volumes
- Densities
- Vapor-Liquid Equilibria

„Thermophysical Properties“: Overview of Available Data

Methanol / Water

Activity Coefficients at Infinite Dilution

Components

No.	Formula	Molar Mass	CAS Registry Number	Name
1	CH_4O	32.042	67-56-1	Methanol
2	H_2O	18.015	7732-18-5	Water

Water solved in Methanol

Temperature [K]	Activity Coeff. at Inf. Dil.	Measurement Method	Source
298.15	1.6300	CPEQ	4
298.15	4.1800	OTHR	2
307.75	1.6000	EBUL	1
313.15	2.2000	STAT	3
317.85	1.8000	EBUL	1
323.15	3.2600	OTHR	2
327.85	1.7000	EBUL	1
333.15	1.7700	CPEQ	4
337.05	1.7600	EBUL	1
373.15	1.8700	CPEQ	4

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List of measurement methods

Short Term	Explanation
CPEQ	calculated from phase equilibria
EBUL	ebulliometry
OTHR	other techniques
STAT	static method

List of References

1	Bergmann D.L., Eckert C.A.: Measurement of Limiting Activity Coefficients for Aqueous Systems by Differential Ebulliometry. Fluid Phase Equilib. 63 (1991) 141-150
2	Schmidt T.W.: Determination of Infinite Dilution Activity Coefficients (gamma infinite) using Molecular Beams. US-Patent (1980) 1-16
3	Belousov V.P., Makarova N.I., Sabylin I.I.: Thermodynamic Properties of the Water-Ethanol-Dioxan Ternary System at 25°C. Viniti (1973) 1-10
4	Pierotti G.J., Deal C.H., Derr E.L.: (Addendum included). Ind.Eng.Chem. 51 (1959) 95-102

Methanol solved in Water

Temperature [K]	Activity Coeff. at Inf. Dil.	Measurement Method	Source
273.35	1.2300	STAT	26
283.15	1.4000	STAT	26
283.15	1.4100	DILU	22
293.15	1.5500	DILU	22
293.15	1.5500	STAT	26
293.15	1.6800	STAT	16
293.15	2.6900	GLCI	1
297.45	2.1200	GLCI	2
298.15	1.5300	HENR	15
298.15	1.5300	CPEQ	23
298.15	1.5800	GLCI	17
298.15	1.6400	GLCR	8
298.15	1.6400	DILU	6

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- **RoHS** (Restriction of Hazardous Substances)
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Name benzenemethanol **Formula:** C_7H_8O

CAS-RN 100-51-6 **Molecular Weight:** 108.138 g/mol

EG-Index: 603-057-00-5 (93/72/EEC)

EINECS: 202-859-9 (EINECS)

Hazard Information (Dangerous Substances Directive 67/548/EEC)

Hazard symbol	 Xn Harmful	93/72/EEC
R-Phrase	20/22 R20/22 Harmful by inhalation and if swallowed.	93/72/EEC
S-Phrase	(2-)26 S2 Keep out of the reach of children. S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.	93/72/EEC

GHS classification (Globally Harmonized System)

Regulation on Classification, Labelling and Packaging of Substances and Mixtures (CLP)

Signal Word	Warning		EC/1272/2008
Pictogram			
Hazard Statements	H332	Harmful if inhaled.	
	H302	Harmful if swallowed.	
Precautionary Statements	P261	Avoid breathing dust/fume/gas/mist/vapours/spray.	
	P264	Wash ... thoroughly after handling.	
	P270	Do no eat, drink or smoke when using this product.	
	P271	Use only outdoors or in a well-ventilated area.	
	P301+P312	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.	
	P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.	
	P312	Call a POISON CENTER or doctor/physician if you feel unwell.	
	P330	Rinse mouth.	
	P501	Dispose of contents/container to ...	
Classification	Acute Tox. 4 * Acute Tox. 4 *		
EC-Reference	603-057-00-5		

European CHemicals Agency (ECHA) pre-registration

Pre-registered substance	EC-Number: 202-859-9 CAS-Number: 100-51-6 Name: benzyl alcohol Synonym: - Registration Date: 30/11/2010	ECHA pre

References

93/72/EEC

Short: 93/72/EEC
Title: Commission Directive 93/72/EEC of 1 September 1993 adapting to technical progress for the nineteenth time Council Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances
Author: Council of the European Economic Community
Source: *Official Journal of the European Communities*
Volume: L 258 A (16.10.1993)
Page: 1-1409
Year: 1993
Keyword: hazardous materials; hazard classification
Internet Resource: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31993L0072:EN:HTML
Publish_Date: 1993/10/16

EC/1272/2008

Short: EC/1272/2008
Title: REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006
Author: European Parliament; Council of the European Union
Source: *Official Journal of the European Union*

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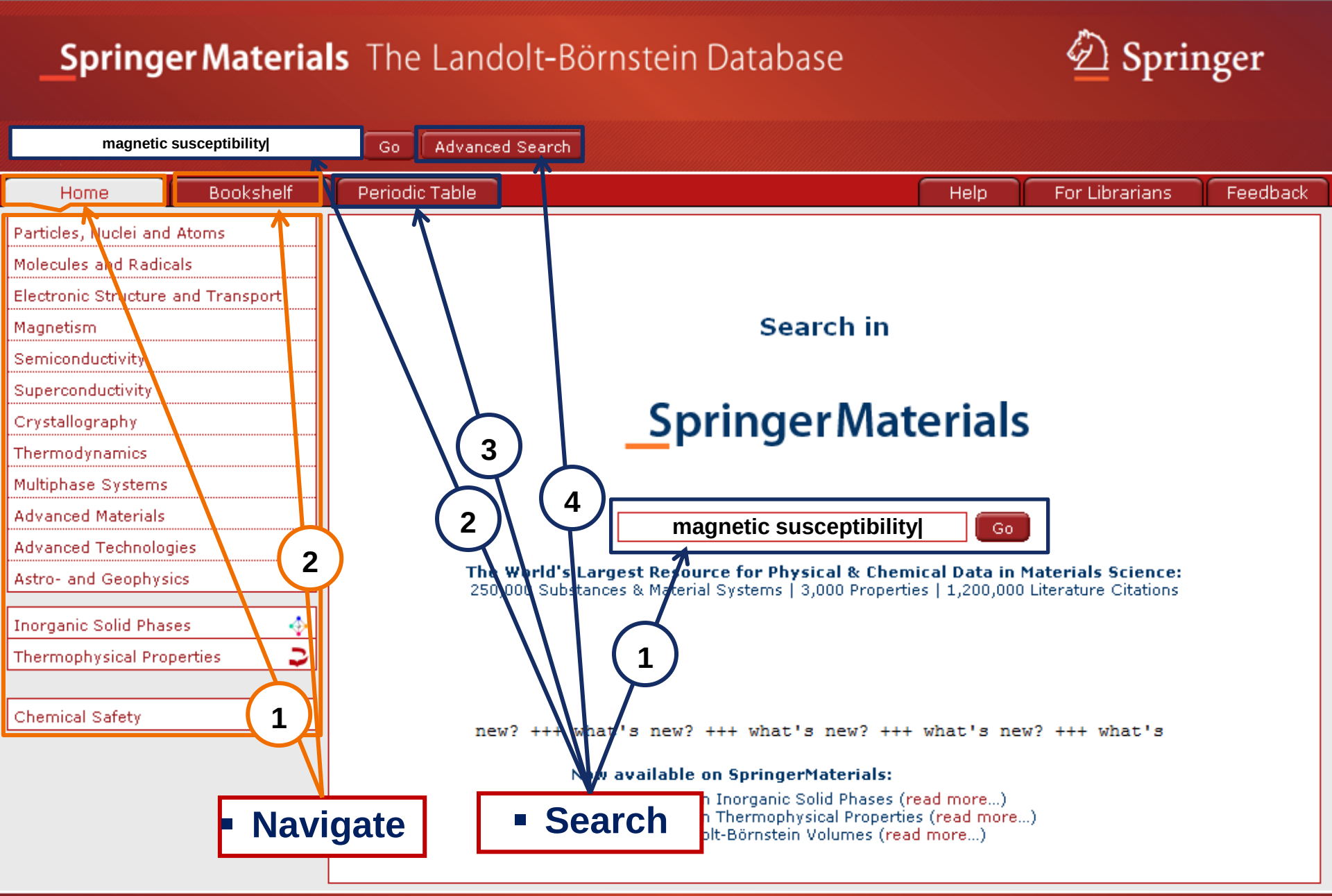

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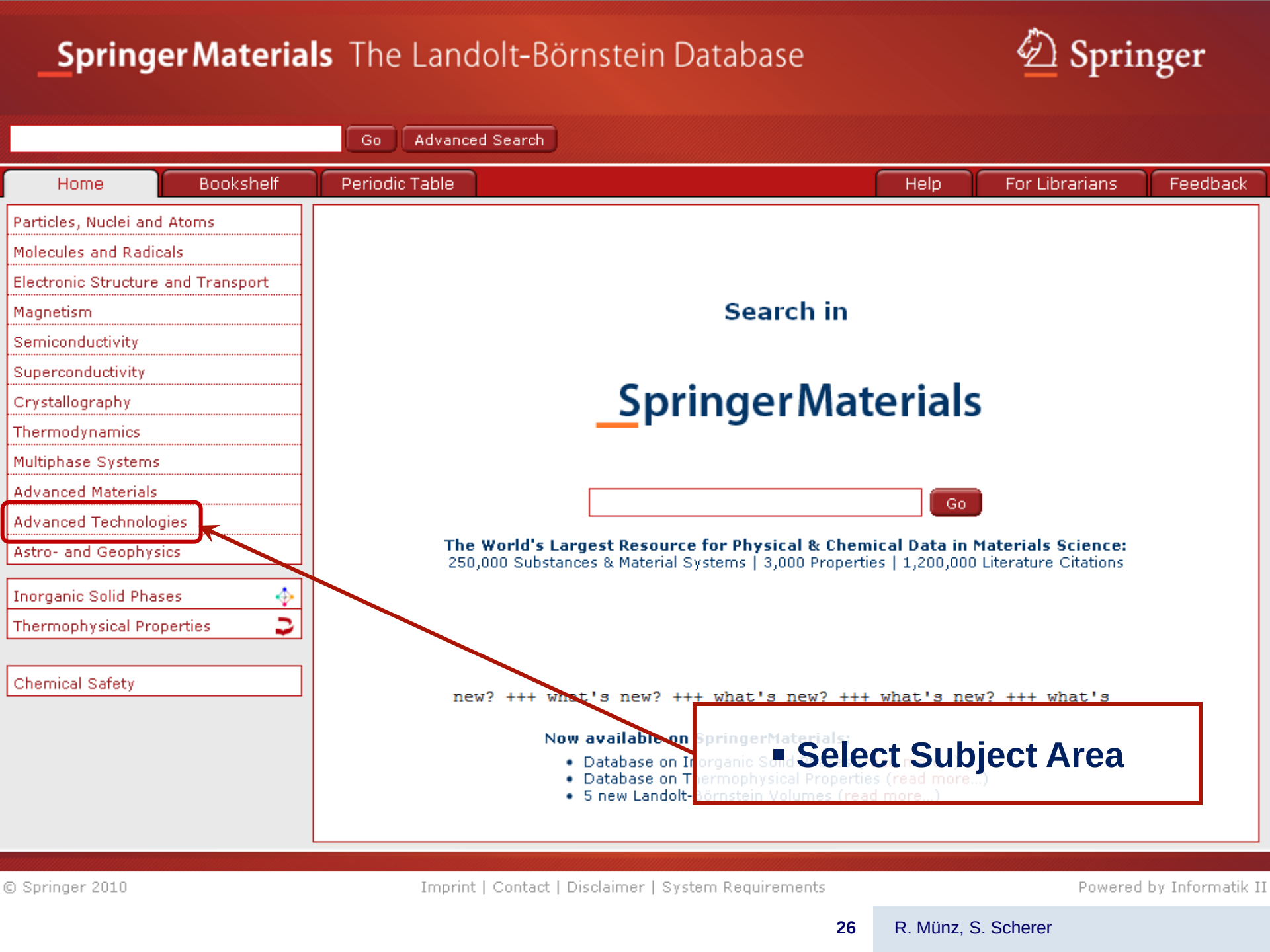
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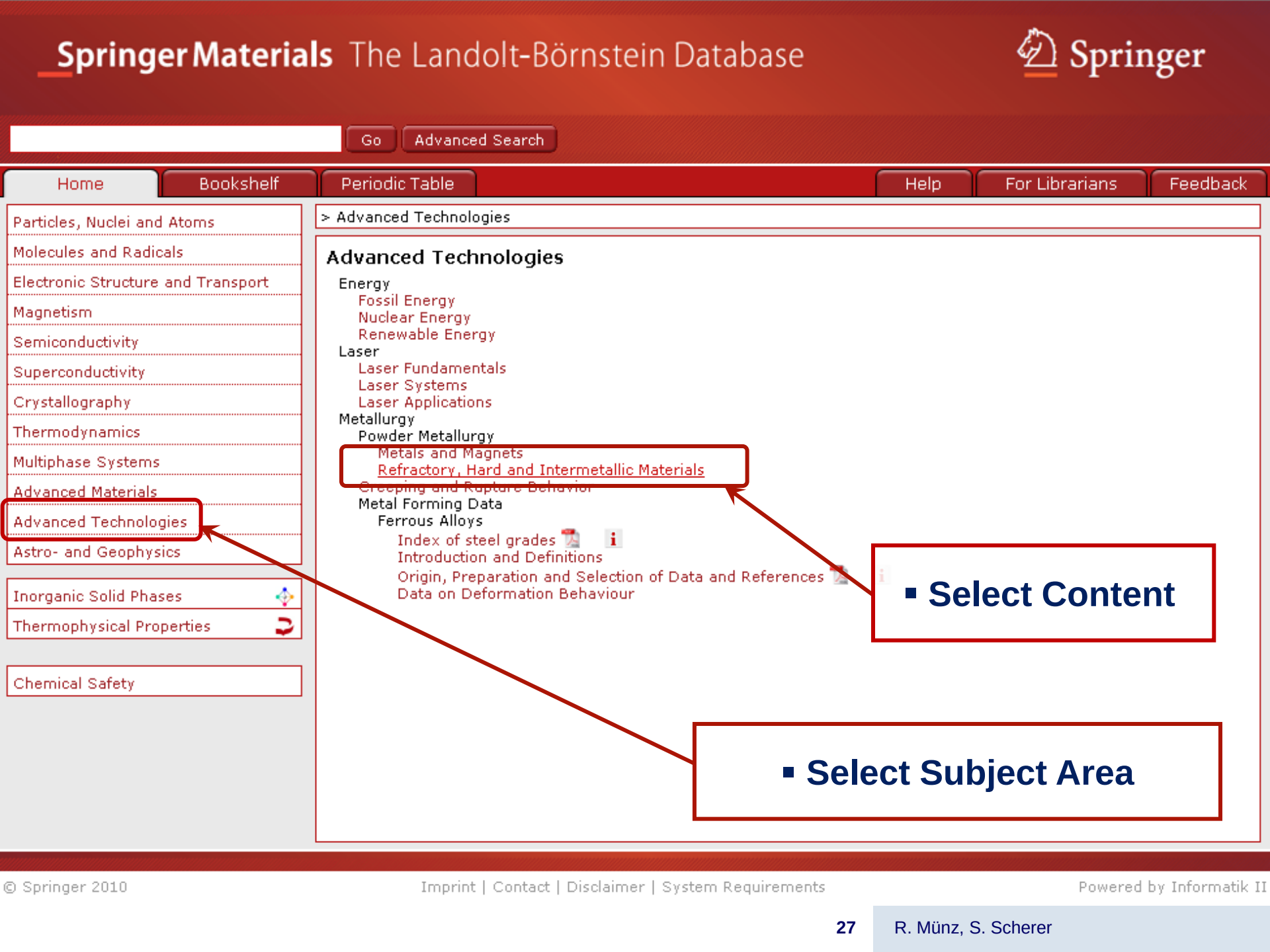
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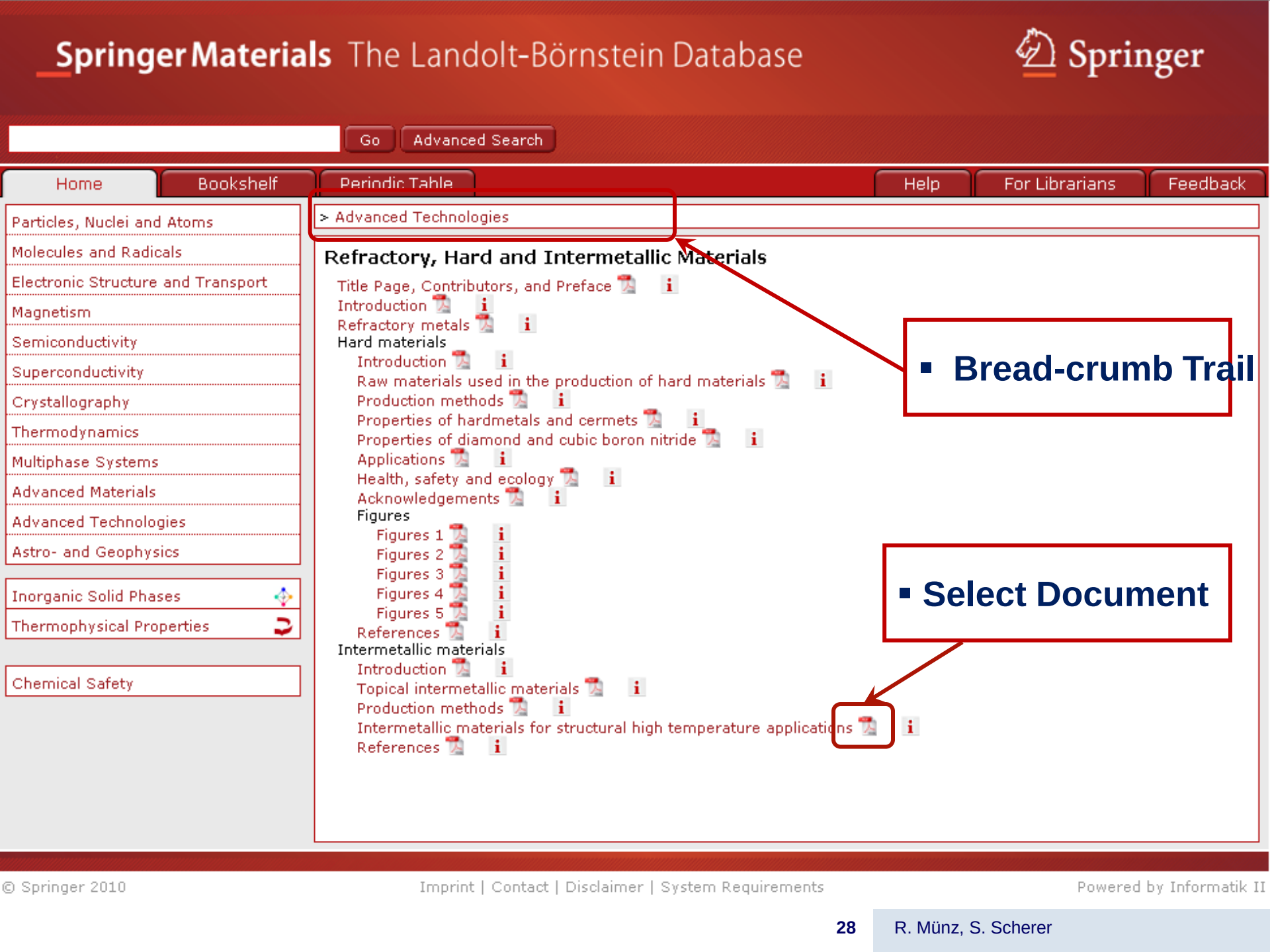
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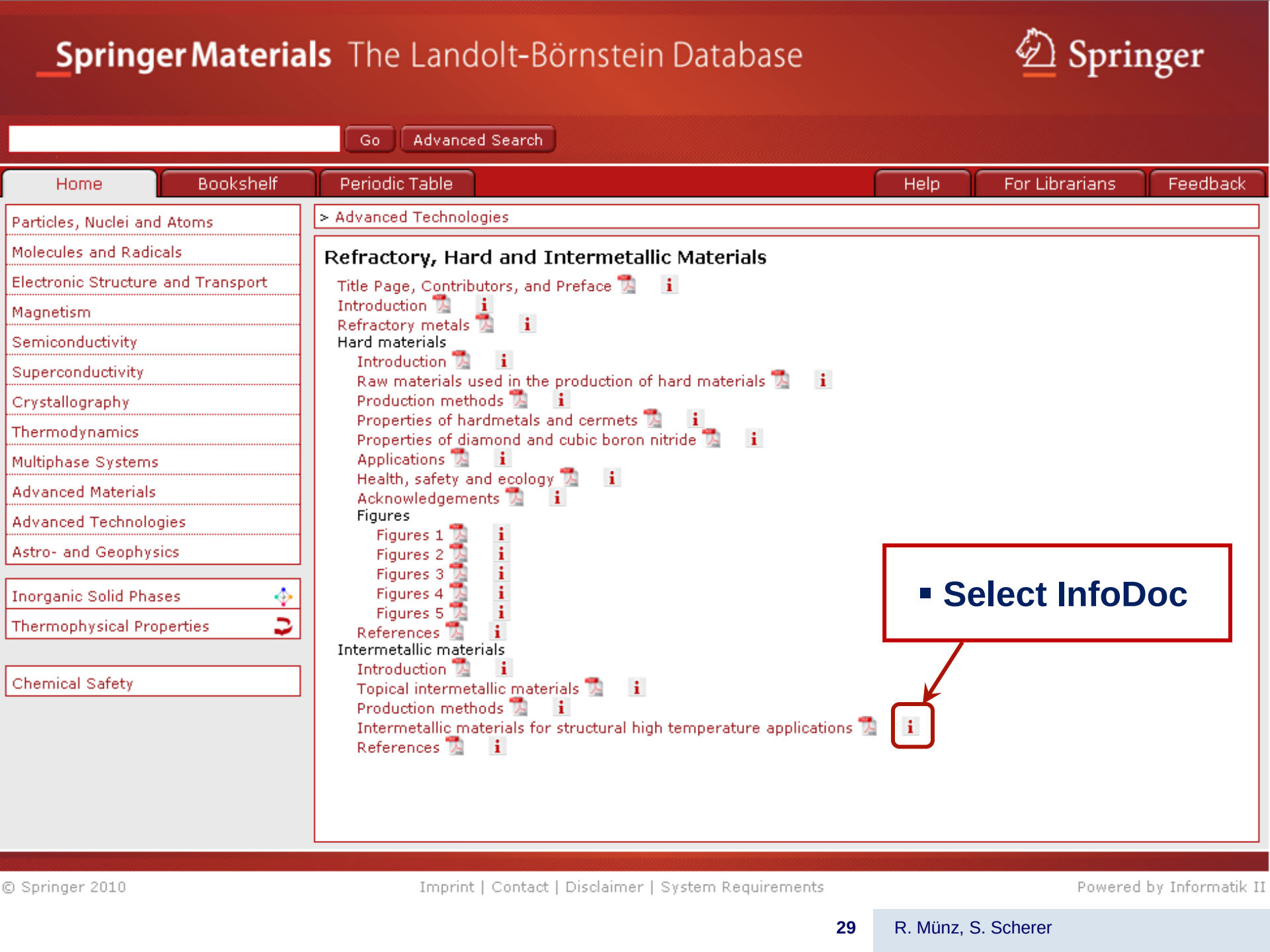
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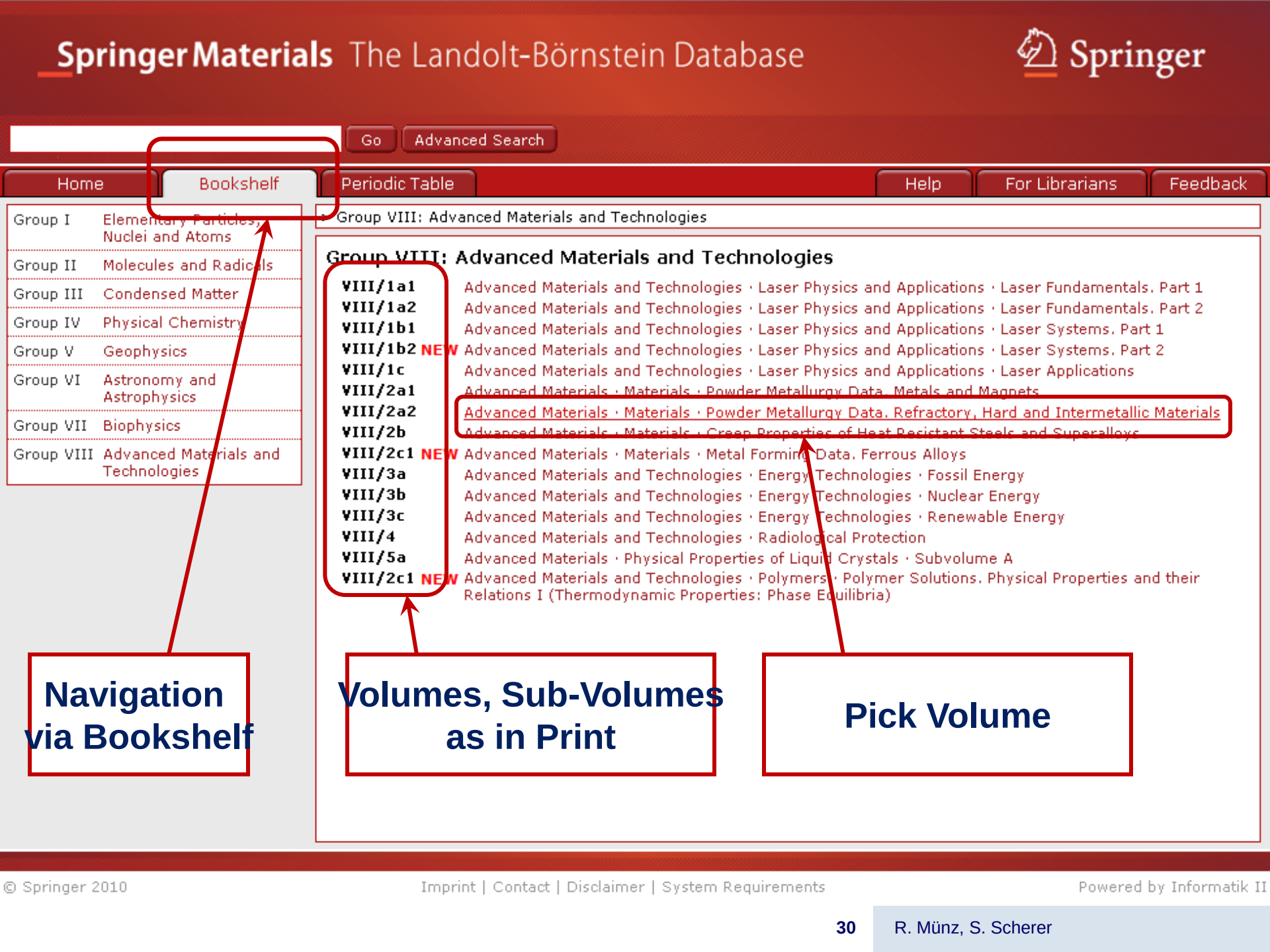
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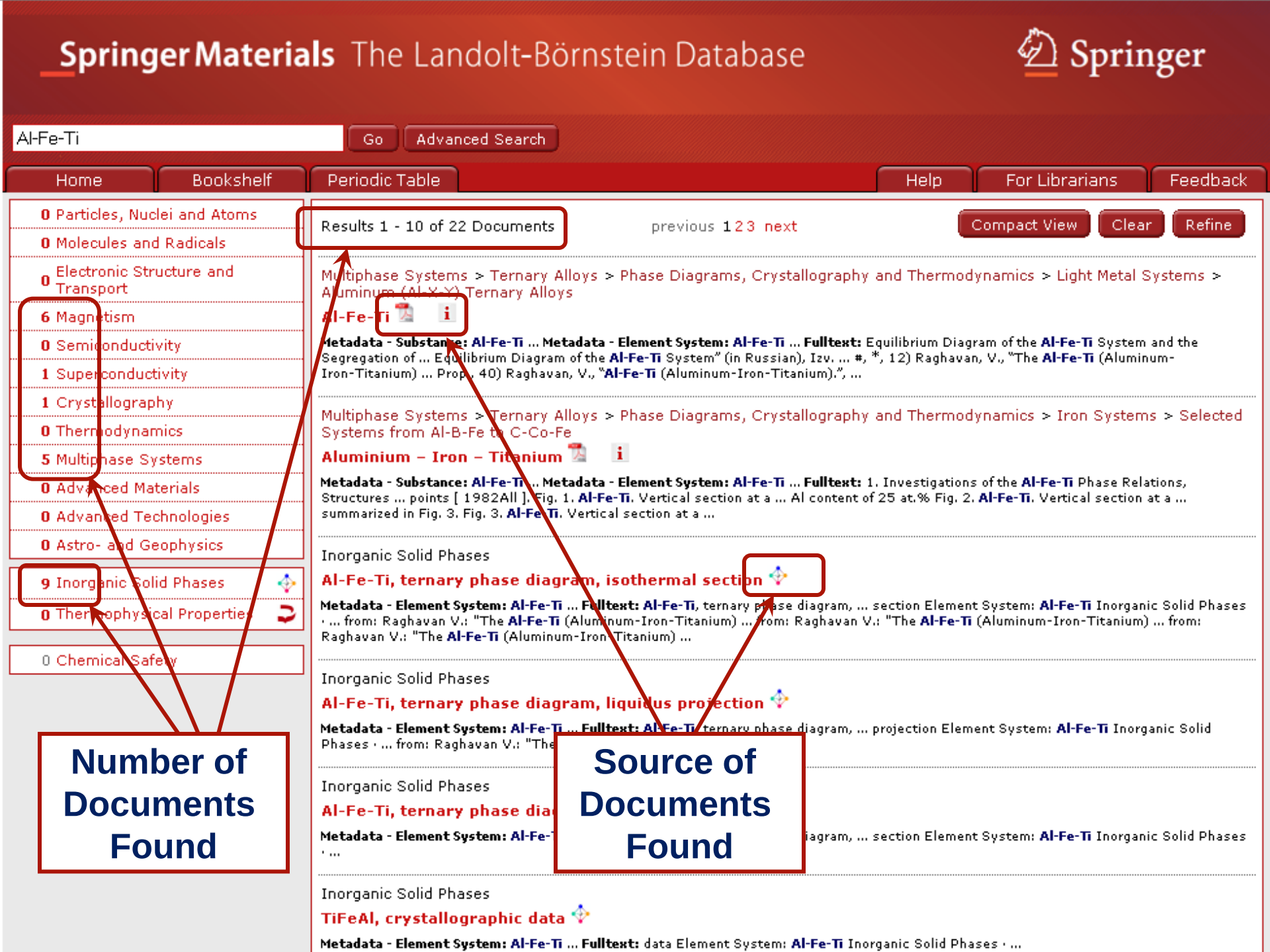
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- The **Al-Fe-Ti** (Aluminum-Iron-Titanium)
- **Al–Fe–Ti** 35 [1992Gho] Ghosh, G., "Al
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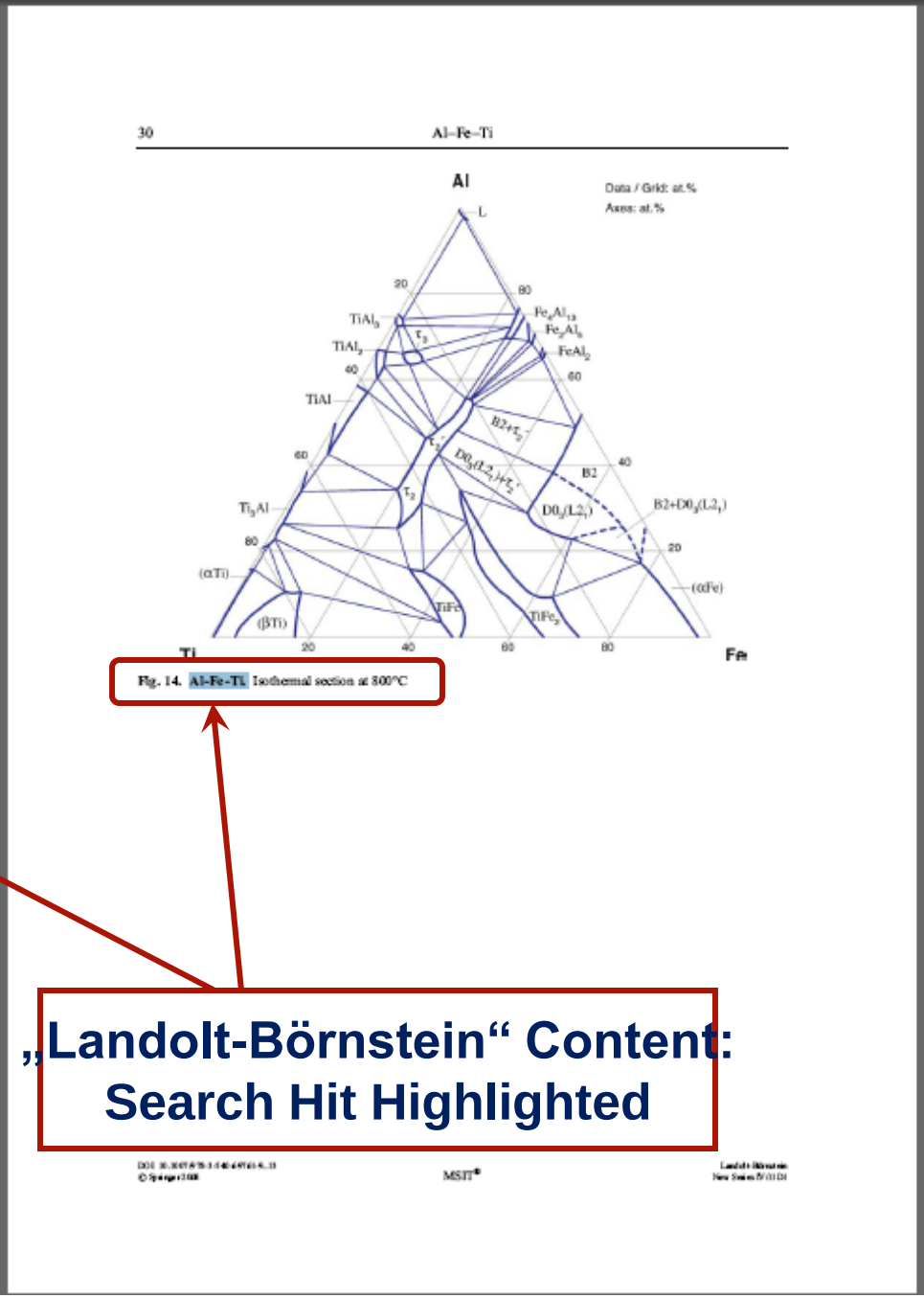

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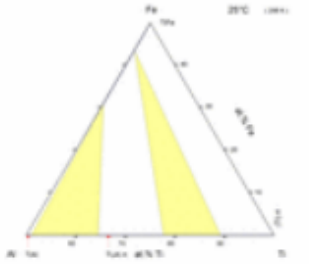
Al-Fe-Ti, ternary phase diagram, isothermal section
Element System: Al-Fe-Ti

Inorganic Solid Phases · phase diagrams

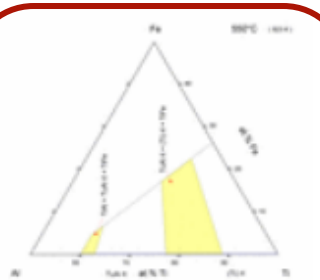
Diagram details: Al conc.[0-50 at.%] vs. Fe conc.[0-50 at.%] vs. Ti conc.[50-100 at.%]



Phase Diagram C975737

from:
Seibold A., Seibold A., Seibold A., Seibold A.: "Phasengleichgewichte in den ternären Systemen Ti-Fe-O und Ti-Al-Fe", Z. Metallkd. **72** (1981) 712-719.

Diagram details: Al conc.[0-30 wt.%] vs. Fe conc.[0-30 wt.%] vs. Ti conc.[70-100 wt.%]



Phase Diagram C975734

from:
Volkova M.A., Kornilov I.I.: "PHASE EQUILIBRIUM IN TITANIUM-RICH Ti-Al-Fe ALLOYS", Russ. Metall. 3 (1970) 134-137.

Diagram details: Al conc.[0-45 at.%] vs. Fe conc.[0-27 at.%] vs. Ti conc.[55-100 at.%]

„Inorganic Solid Phases“: Overview of Relevant Data Sheets

Element System: Al-Fe-Ti
Ternary Phase Diagram
Investigated Concentration Ranges: Al conc.[0-50 at.%] vs. Fe conc.[0-50 at.%] vs. Ti conc.[50-100 at.%]

Constitution Entry Summary

System	Al-Fe-Ti
Diagram Type	ternary, isothermal section
Concentration Range	partial composition; Ti-TiAl-TiFe / 50-100 at.% Ti
Temperature	298 K
Investigation	experimental
APDIC	non-APDIC

Reference

Seibold A.: "Phasengleichgewichte in den ternären Systemen Ti-Fe-O und Ti-Al-Fe", Z. Metallkd. **72** (1981) 712-719.

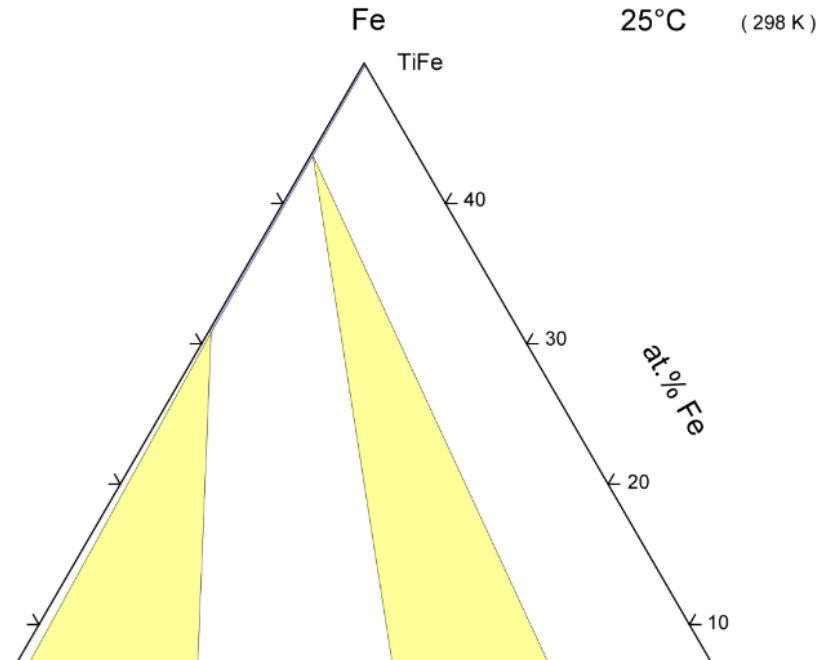
Phase Diagram

Published Phase Diagram

Figure	19
Title	Al-Fe-Ti isothermal section at 25 °C
Parameters	Al conc.[0-50 at.%] vs. Fe conc.[0-50 at.%] vs. Ti conc.[50-100 at.%]

Redrawn Phase Diagram

Concentration range	partial composition; Ti-TiAl-TiFe
Enlargement	0.6



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Thermophysical Properties

Methanol / Water

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Electron transfer reactions with organic compounds

Fulltext: (10%) (30%) (60%) (80%) (95%) **methanol water** + acetonitrile (84%) water + ...

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Trisubstituted pyrrolidinyl-N-oxyls

Fulltext: oxidation ESR / 298 Toluene **Methanol Water** Photolysis of oxygen-ated ... and benzo-phenone ESR / 298 **Methanol Water** Photolysis of glycine, ...

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Tetrasubstituted pyrrolidine-N-oxyls

Fulltext: ESR / 298 Benzene **Methanol Water**, pH 1.0 (pH 14.0) Reaction of ...

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Reactions of 1,4-biradicals to yield molecular produ

Fulltext: acetonitrile THF 2-propanol **methanol water** dimethylsulfo

Advanced Materials > Proteins > Structural and Physical Da proteins and related substances

Tables 1...9

Fulltext: 75 % dioxane water 1 M NaCl **methanol water** water chloroform isopropyl ...

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„Thermophysical Properties“: Data Sheet Found

Methanol / Water

Thermophysical Data in the Dortmund Data Bank

Components

No.	Formula	Molar Mass	CAS Registry Number	Name
1	CH_4O	32.042	67-56-1	Methanol
2	H_2O	18.015	7732-18-5	Water

List of Available Properties

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- Excess Enthalpies
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- Excess Volumes
- Densities
- Vapor-Liquid Equilibria

„Thermophysical Properties“: Overview of Available Data

Methanol / Water

Activity Coefficients at Infinite Dilution

Components

No.	Formula	Molar Mass	CAS Registry Number	Name
1	CH_4O	32.042	67-56-1	Methanol
2	H_2O	18.015	7732-18-5	Water

Water solved in Methanol

Temperature [K]	Activity Coeff. at Inf. Dil.	Measurement Method	Source
298.15	1.6300	CPEQ	4
298.15	4.1800	OTHR	2
307.75	1.6000	EBUL	1
313.15	2.2000	STAT	3
317.85	1.8000	EBUL	1
323.15	3.2600	OTHR	2
327.85	1.7000	EBUL	1
333.15	1.7700	CPEQ	4
337.05	1.7600	EBUL	1
373.15	1.8700	CPEQ	4

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List of measurement methods

Short Term	Explanation
CPEQ	calculated from phase equilibria
EBUL	ebulliometry
OTHR	other techniques
STAT	static method

List of References

1	Bergmann D.L., Eckert C.A.: Measurement of Limiting Activity Coefficients for Aqueous Systems by Differential Ebulliometry. Fluid Phase Equilib. 63 (1991) 141-150
2	Schmidt T.W.: Determination of Infinite Dilution Activity Coefficients (gamma infinite) using Molecular Beams. US-Patent (1980) 1-16
3	Belousov V.P., Makarova N.I., Sabylin I.I.: Thermodynamic Properties of the Water-Ethanol-Dioxan Ternary System at 25°C. Viniti (1973) 1-10
4	Pierotti G.J., Deal C.H., Derr E.L.: (Addendum included). Ind.Eng.Chem. 51 (1959) 95-102

Methanol solved in Water

Temperature [K]	Activity Coeff. at Inf. Dil.	Measurement Method	Source
273.35	1.2300	STAT	26
283.15	1.4000	STAT	26
283.15	1.4100	DILU	22
293.15	1.5500	DILU	22
293.15	1.5500	STAT	26
293.15	1.6800	STAT	16
293.15	2.6900	GLCI	1
297.45	2.1200	GLCI	2
298.15	1.5300	HENR	15
298.15	1.5300	CPEQ	23
298.15	1.5800	GLCI	17
298.15	1.6400	GLCR	8
298.15	1.6400	DILU	6

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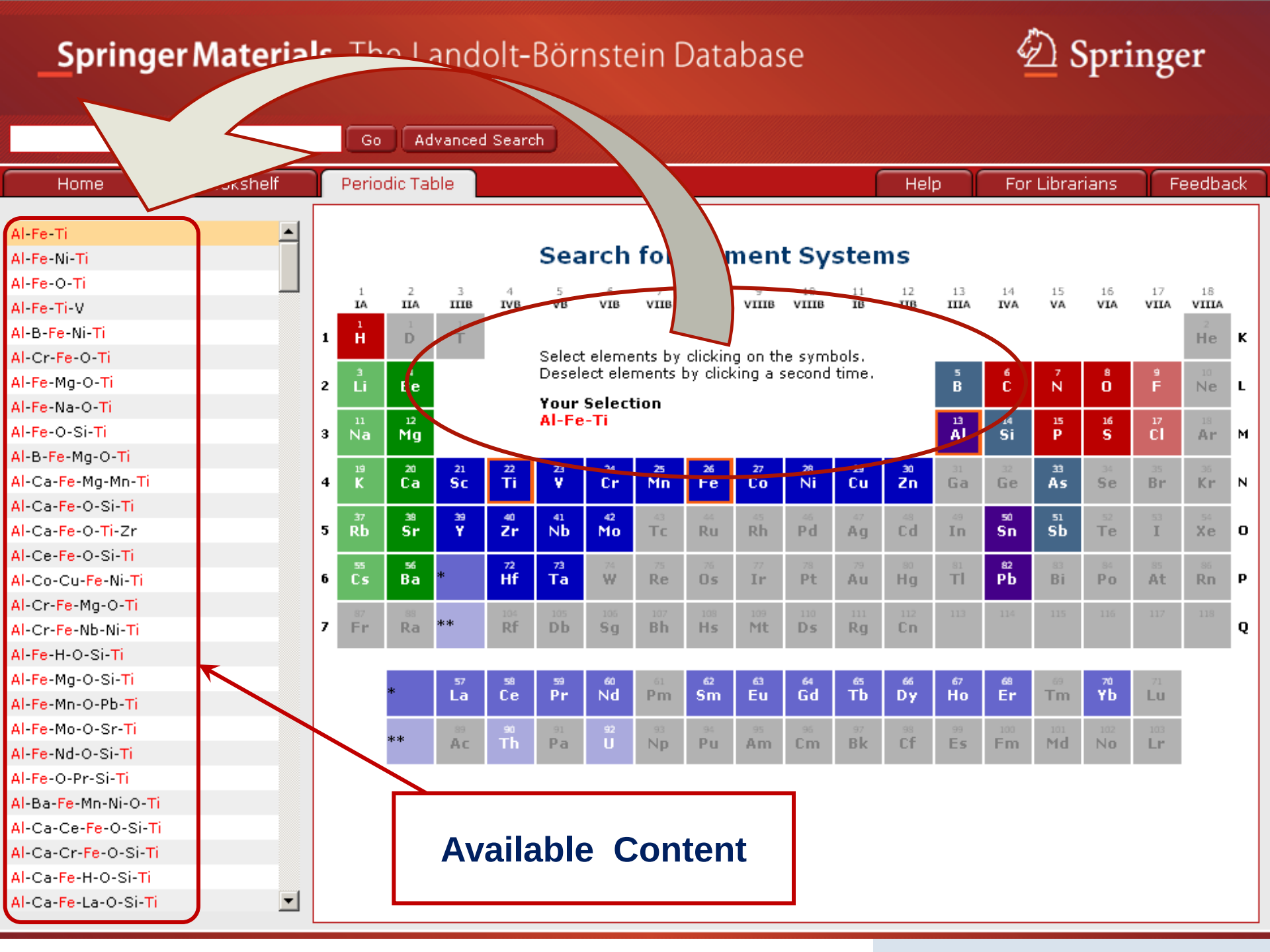
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Al-Cr-Fe-Mg-O-Ti
Al-Cr-Fe-Nb-Ni-Ti
Al-Fe-H-O-Si-Ti
Al-Fe-Mg-O-Si-Ti
Al-Fe-Mn-O-Pb-Ti
Al-Fe-Mo-O-Sr-Ti
Al-Fe-Nd-O-Si-Ti
Al-Fe-O-Pr-Si-Ti
Al-Ba-Fe-Mn-Ni-O-Ti
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Al-Ca-Fe-H-O-Si-Ti
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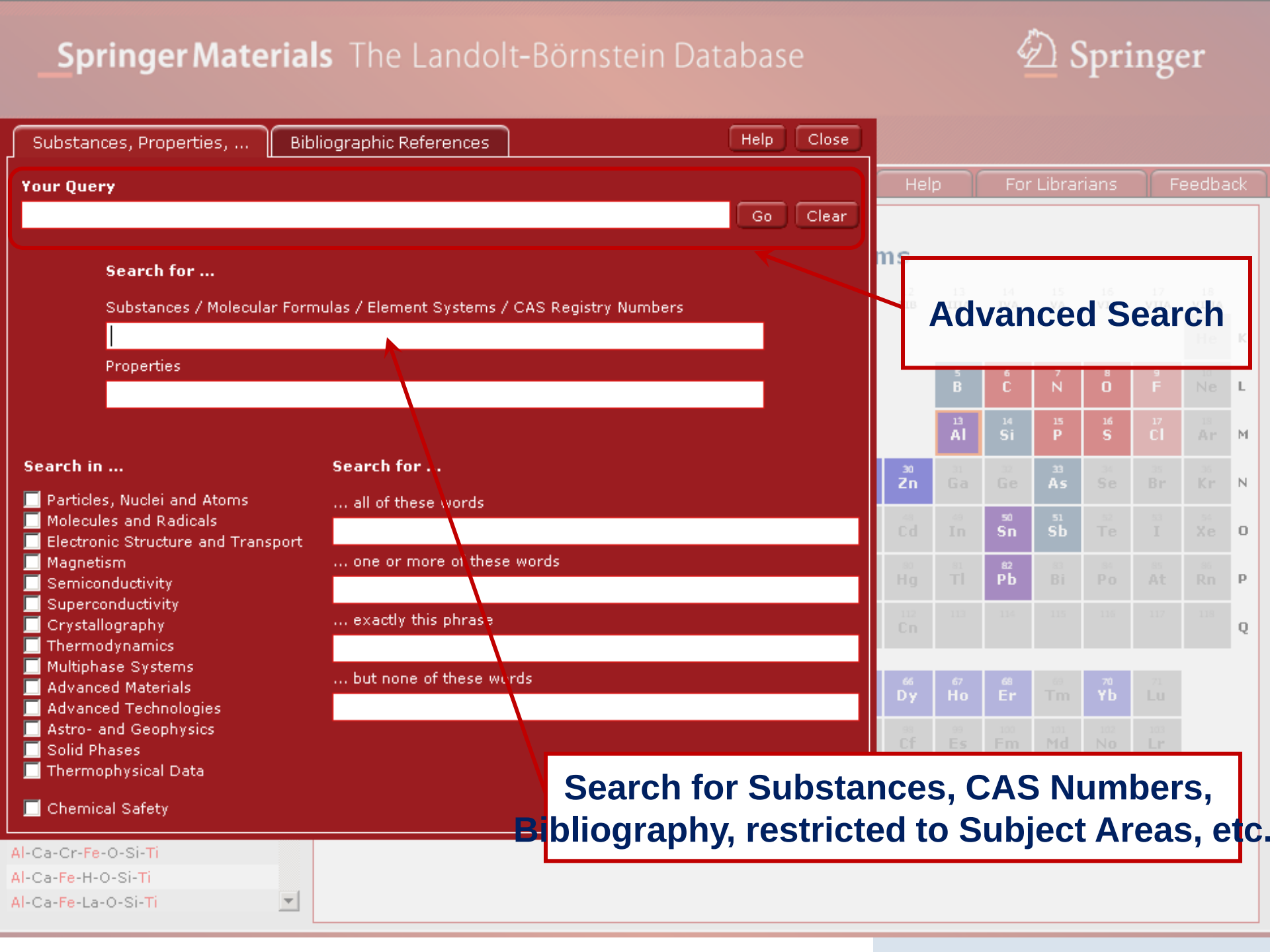
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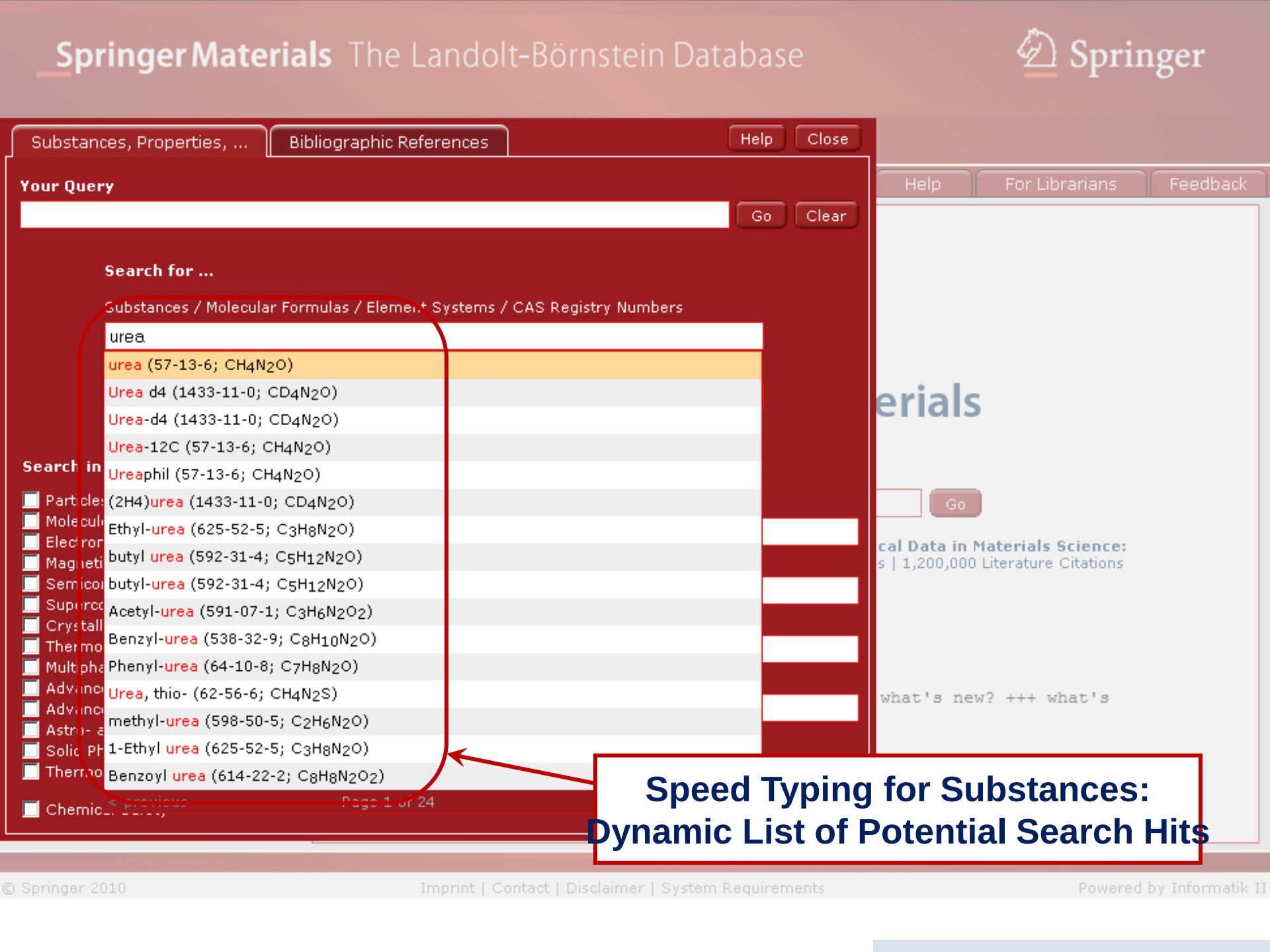
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urea
urea (57-13-6; CH4N2O)
Urea d4 (1433-11-0; CD4N2O)
Urea-d4 (1433-11-0; CD4N2O)
Urea-12C (57-13-6; CH4N2O)
Ureaphil (57-13-6; CH4N2O)
(2H4)urea (1433-11-0; CD4N2O)
Ethyl-urea (625-52-5; C3H8N2O)
butyl urea (592-31-4; C5H12N2O)
butyl-urea (592-31-4; C5H12N2O)
Acetyl-urea (591-07-1; C3H6N2O2)
Benzyl-urea (538-32-9; C8H10N2O)
Phenyl-urea (64-10-8; C7H8N2O)
Urea, thio- (62-56-6; CH4N2S)
methyl-urea (598-50-5; C2H6N2O)
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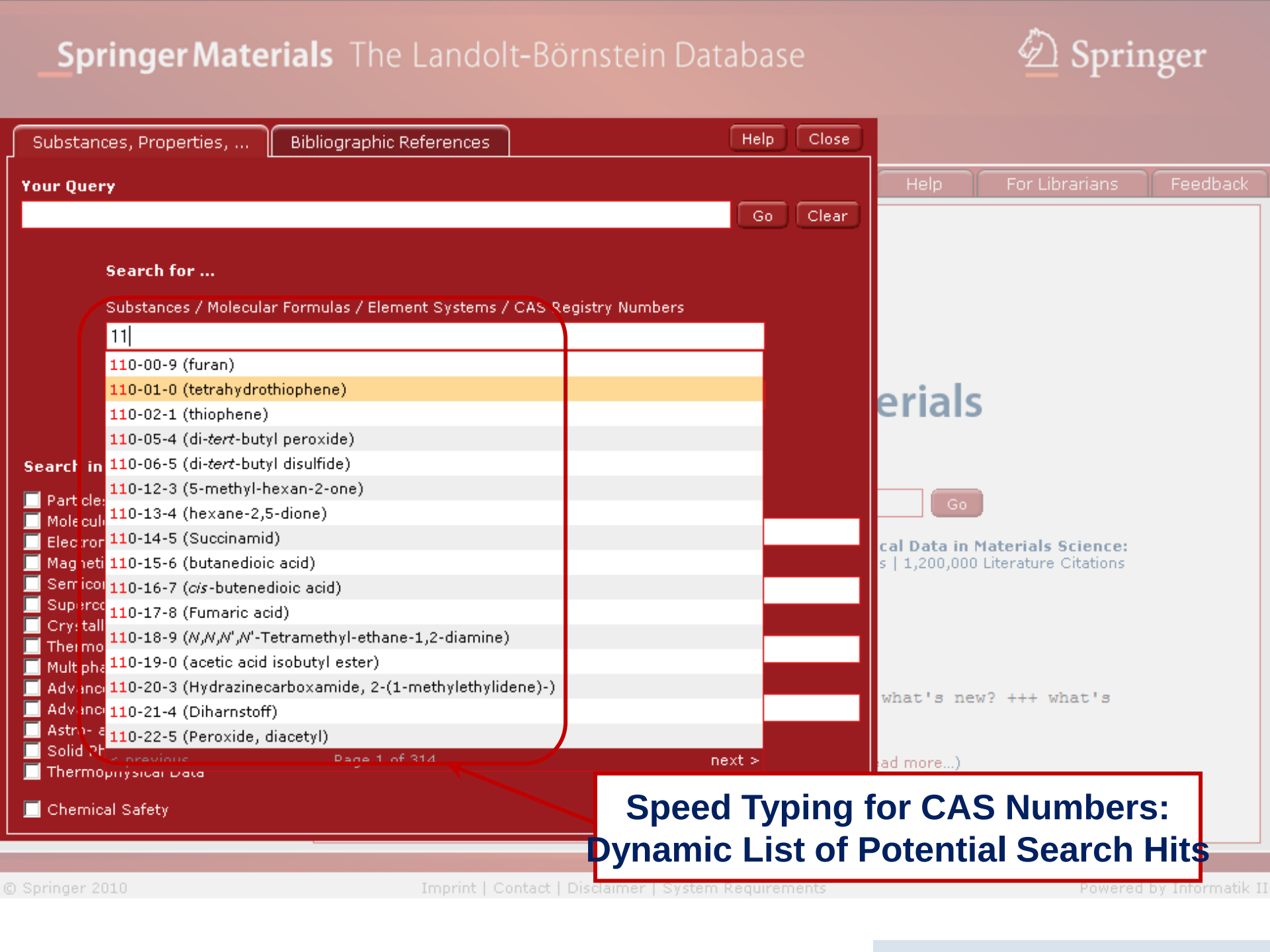
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110-00-9 (furan)
110-01-0 (tetrahydrothiophene)
110-02-1 (thiophene)
110-05-4 (di-tert-butyl peroxide)
110-06-5 (di-tert-butyl disulfide)
110-12-3 (5-methyl-hexan-2-one)
110-13-4 (hexane-2,5-dione)
110-14-5 (Succinamid)
110-15-6 (butanedioic acid)
110-16-7 (cis-butenedioic acid)
110-17-8 (Fumaric acid)
110-18-9 (N,N,N',N'-Tetramethyl-ethane-1,2-diamine)
110-19-0 (acetic acid isobutyl ester)
110-20-3 (Hydrazinecarboxamide, 2-(1-methylethylidene)-)
110-21-4 (Diharnstoff)
110-22-5 (Peroxide, diacetyl)
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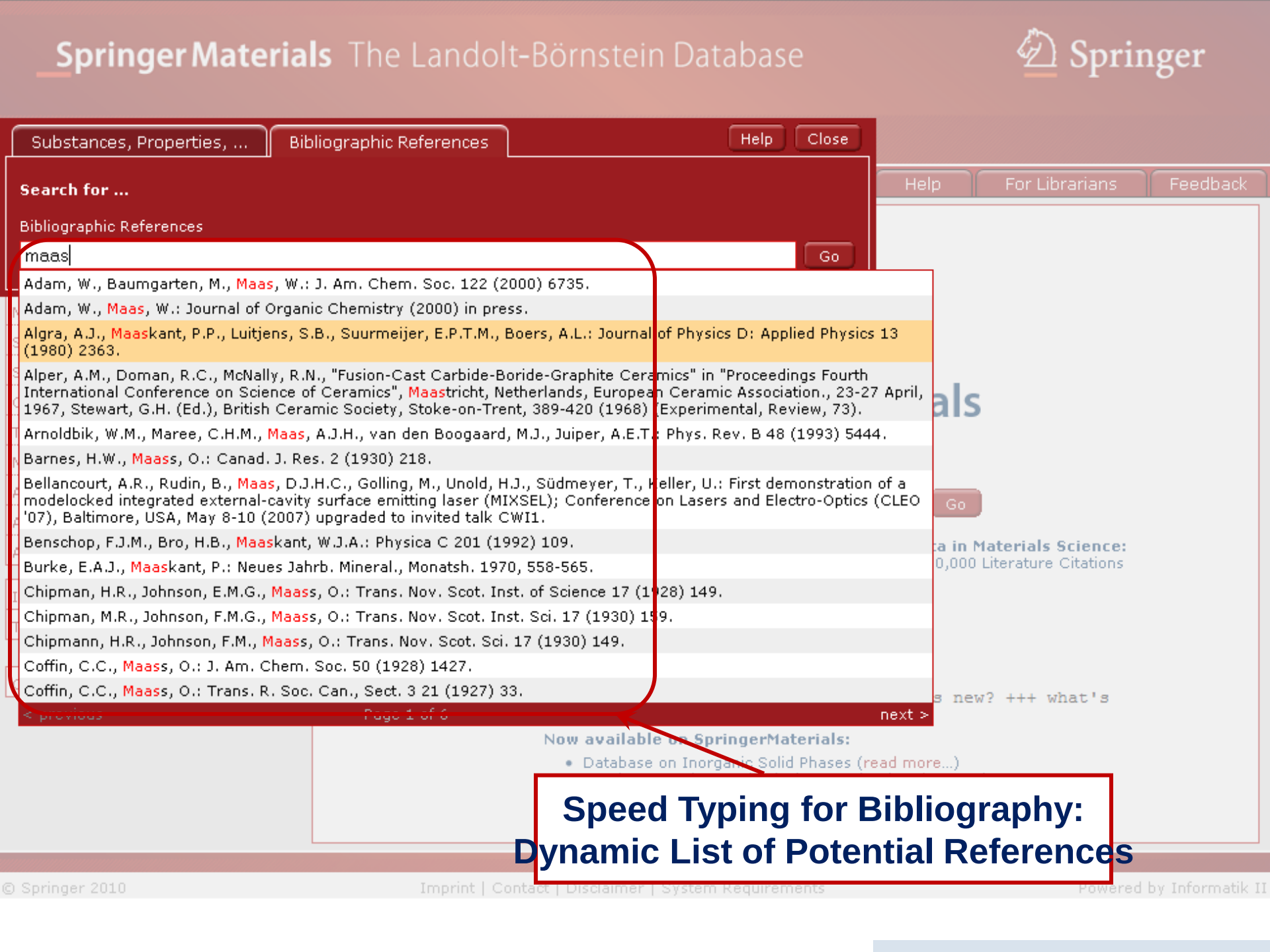

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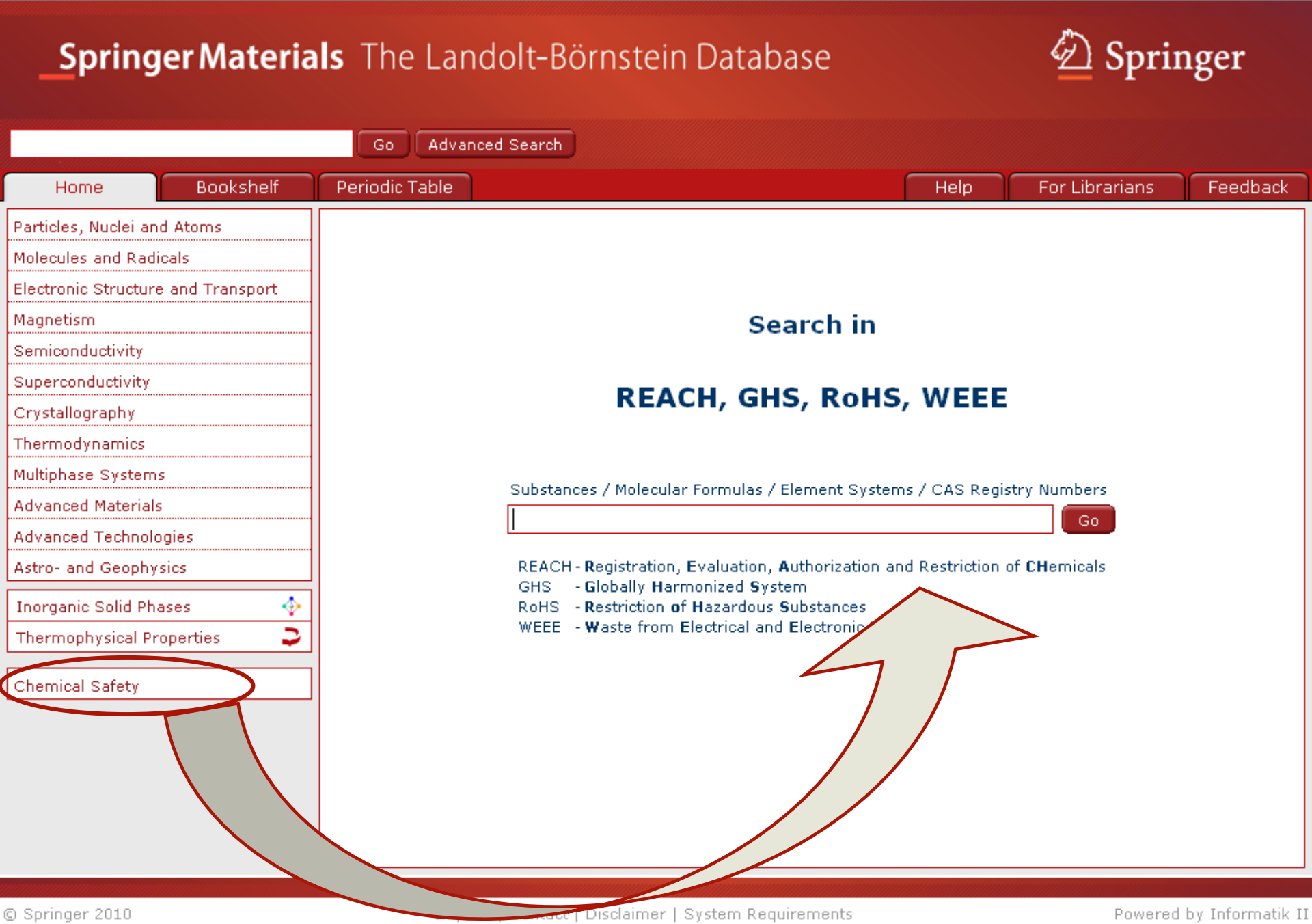
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GHS - Globally Harmonized System
RoHS - Restriction of Hazardous Substances
WEEE - Waste from Electrical and Electronic
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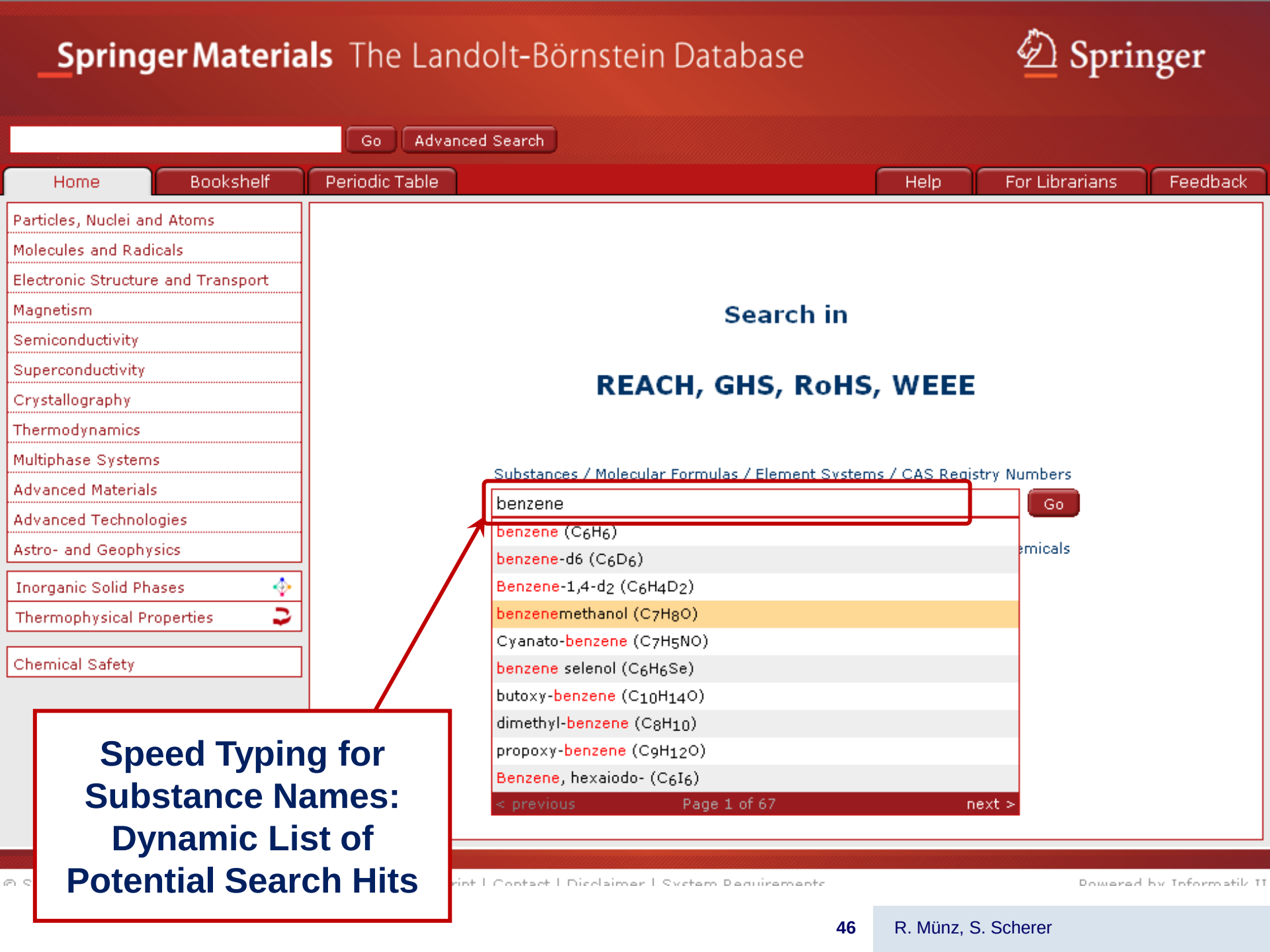
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Benzene-1,4-d2 (C6H4D2)
benzenemethanol (C7H8O)
Cyanato-benzene (C7H5NO)
benzene selenol (C6H6Se)
butoxy-benzene (C10H14O)
dimethyl-benzene (C8H10)
propoxy-benzene (C9H12O)
Benzene, hexaiodo- (C6I6)
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Speed Typing for Substance Names: Dynamic List of Potential Search Hits

European regulations regarding benzenemethanol (C_7H_8O)

Name benzenemethanol **Formula:** C_7H_8O

CAS-RN 100-51-6 **Molecular Weight:** 108.138 g/mol

EG-Index: 603-057-00-5 (93/72/EEC)

EINECS: 202-859-9 (EINECS)

Hazard Information (Dangerous Substances Directive 67/548/EEC)

Hazard symbol	 Xn Harmful	93/72/EEC
R-Phrase	20/22 R20/22 Harmful by inhalation and if swallowed.	93/72/EEC
S-Phrase	(2-)26 S2 Keep out of the reach of children. S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.	93/72/EEC

GHS classification (Globally Harmonized System)

Regulation on Classification, Labelling and Packaging of Substances and Mixtures (CLP)

Signal Word	Warning		EC/1272/2008
Pictogram			
Hazard Statements	H332	Harmful if inhaled.	
	H302	Harmful if swallowed.	
Precautionary Statements	P261	Avoid breathing dust/fume/gas/mist/vapours/spray.	
	P264	Wash ... thoroughly after handling.	
	P270	Do no eat, drink or smoke when using this product.	
	P271	Use only outdoors or in a well-ventilated area.	
	P301+P312	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.	
	P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.	
	P312	Call a POISON CENTER or doctor/physician if you feel unwell.	
	P330	Rinse mouth.	
	P501	Dispose of contents/container to ...	
Classification	Acute Tox. 4 * Acute Tox. 4 *		
EC-Reference	603-057-00-5		

European CHemicals Agency (ECHA) pre-registration

Pre-registered substance	EC-Number: 202-859-9 CAS-Number: 100-51-6 Name: benzyl alcohol Synonym: - Registration Date: 30/11/2010	ECHA pre

References

93/72/EEC

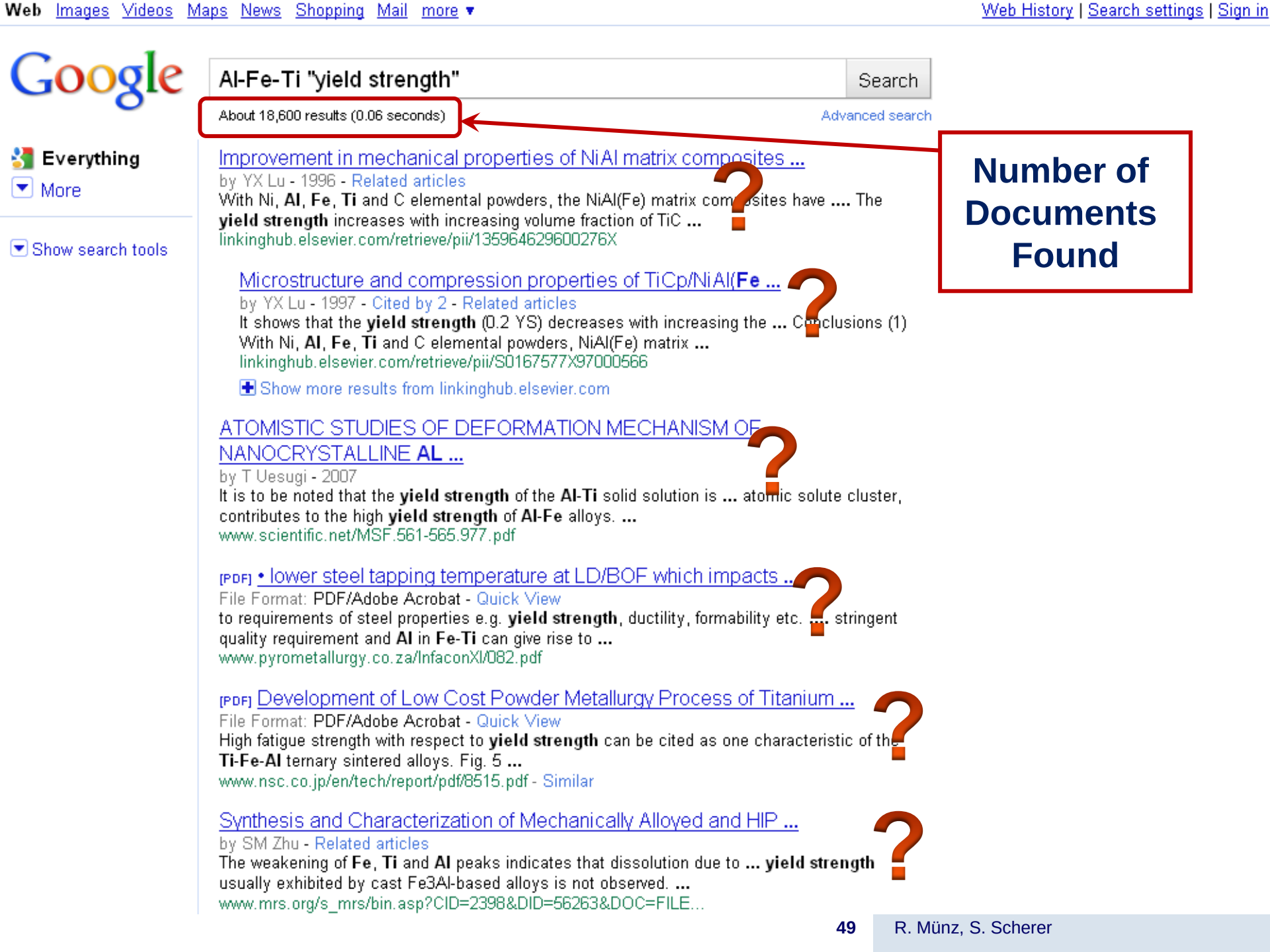
Short: 93/72/EEC
Title: Commission Directive 93/72/EEC of 1 September 1993 adapting to technical progress for the nineteenth time Council Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances
Author: Council of the European Economic Community
Source: *Official Journal of the European Communities*
Volume: L 258 A (16.10.1993)
Page: 1-1409
Year: 1993
Keyword: hazardous materials; hazard classification
Internet Resource: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31993L0072:EN:HTML
Publish_Date: 1993/10/16

EC/1272/2008

Short: EC/1272/2008
Title: REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006
Author: European Parliament; Council of the European Union
Source: *Official Journal of the European Union*

Actual Safety Document

Search Benefits in a Nutshell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by T Uesugi - 2007
It is to be noted that the yield strength of the Al-Ti solid solution is ... atomic solute cluster, contributes to the high yield strength of Al-Fe alloys. ...
www.scientific.net/MSF.561-565.977.pdf
[PDF] • lower steel tapping temperature at LD/BOF which impacts ...
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to requirements of steel properties e.g. yield strength, ductility, formability etc. .... stringent quality requirement and Al in Fe-Ti can give rise to ...
www.pyrometallurgy.co.za/InfaconXI/082.pdf
[PDF] Development of Low Cost Powder Metallurgy Process of Titanium ...
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High fatigue strength with respect to yield strength can be cited as one characteristic of the Ti-Fe-Al ternary sintered alloys. Fig. 5 ...
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The weakening of Fe, Ti and Al peaks indicates that dissolution due to ... yield strength usually exhibited by cast Fe3Al-based alloys is not observed. ...
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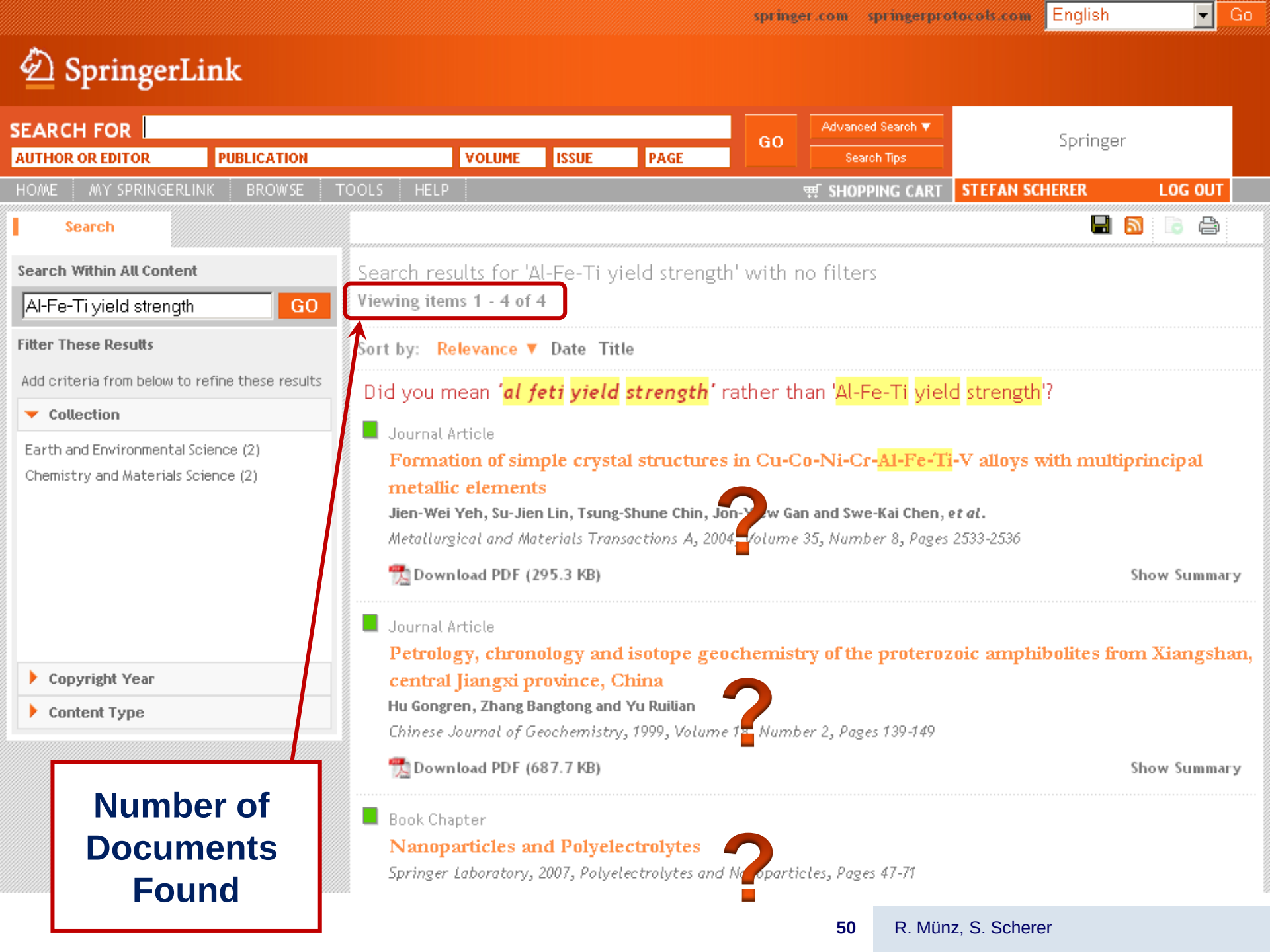
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Formation of simple crystal structures in Cu-Co-Ni-Cr-Al-Fe-Ti-V alloys with multiprincipal metallic elements
Jien-Wei Yeh, Su-Jien Lin, Tsung-Shune Chin, Jon-Yiew Gan and Swe-Kai Chen, et al.
Metallurgical and Materials Transactions A, 2004, Volume 35, Number 8, Pages 2533-2536
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Petrology, chronology and isotope geochemistry of the proterozoic amphibolites from Xiangshan, central Jiangxi province, China
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Chinese Journal of Geochemistry, 1999, Volume 18, Number 2, Pages 139-149
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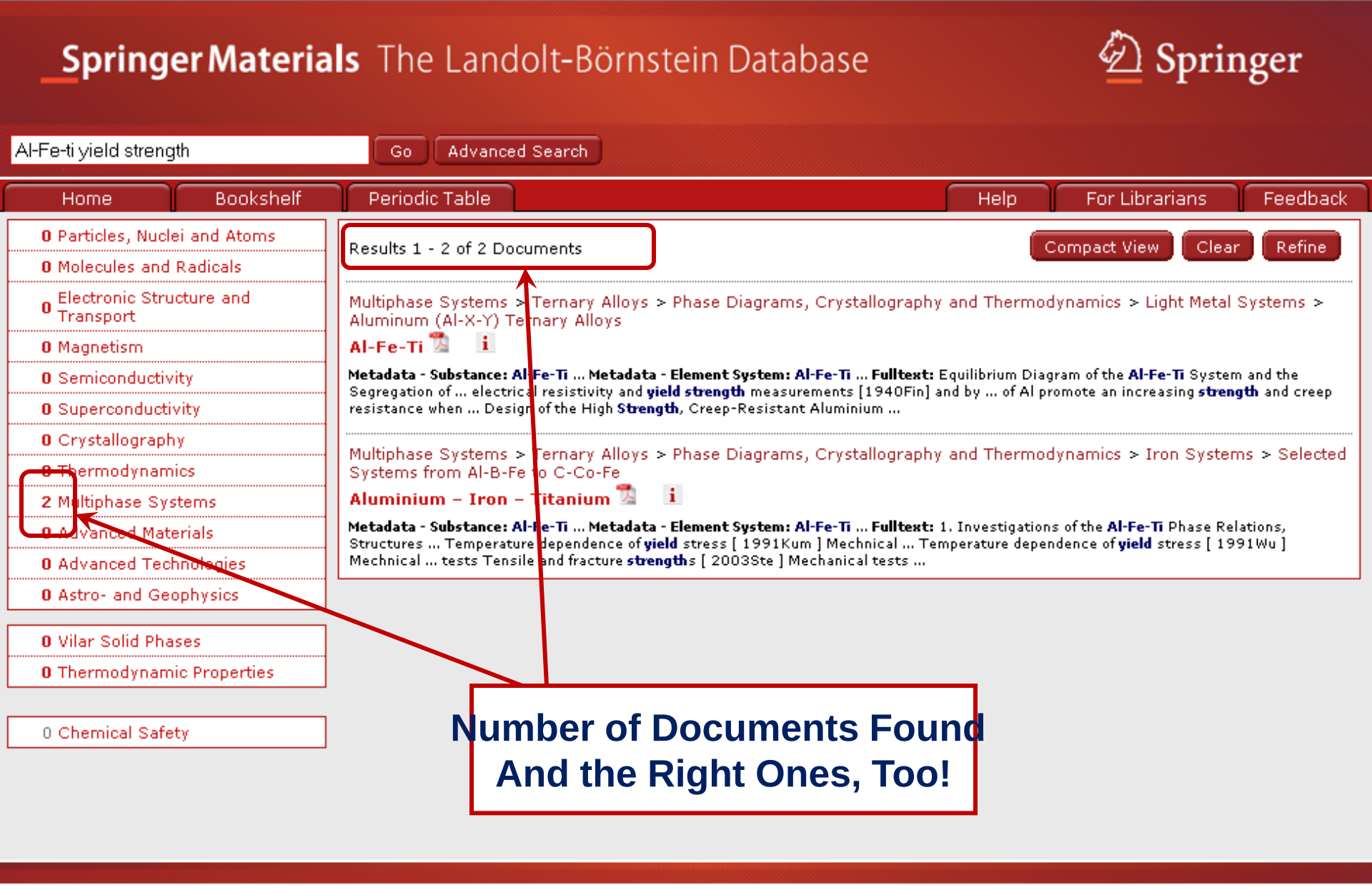
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Al-Fe-Ti
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Multiphase Systems > Ternary Alloys > Phase Diagrams, Crystallography and Thermodynamics > Iron Systems > Selected Systems from Al-B-Fe to C-Co-Fe
Aluminium – Iron – Titanium
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Use Cases

Aircraft engineer needs new alloy for construction of stronger winglets: e.g., Al-Fe-Ti

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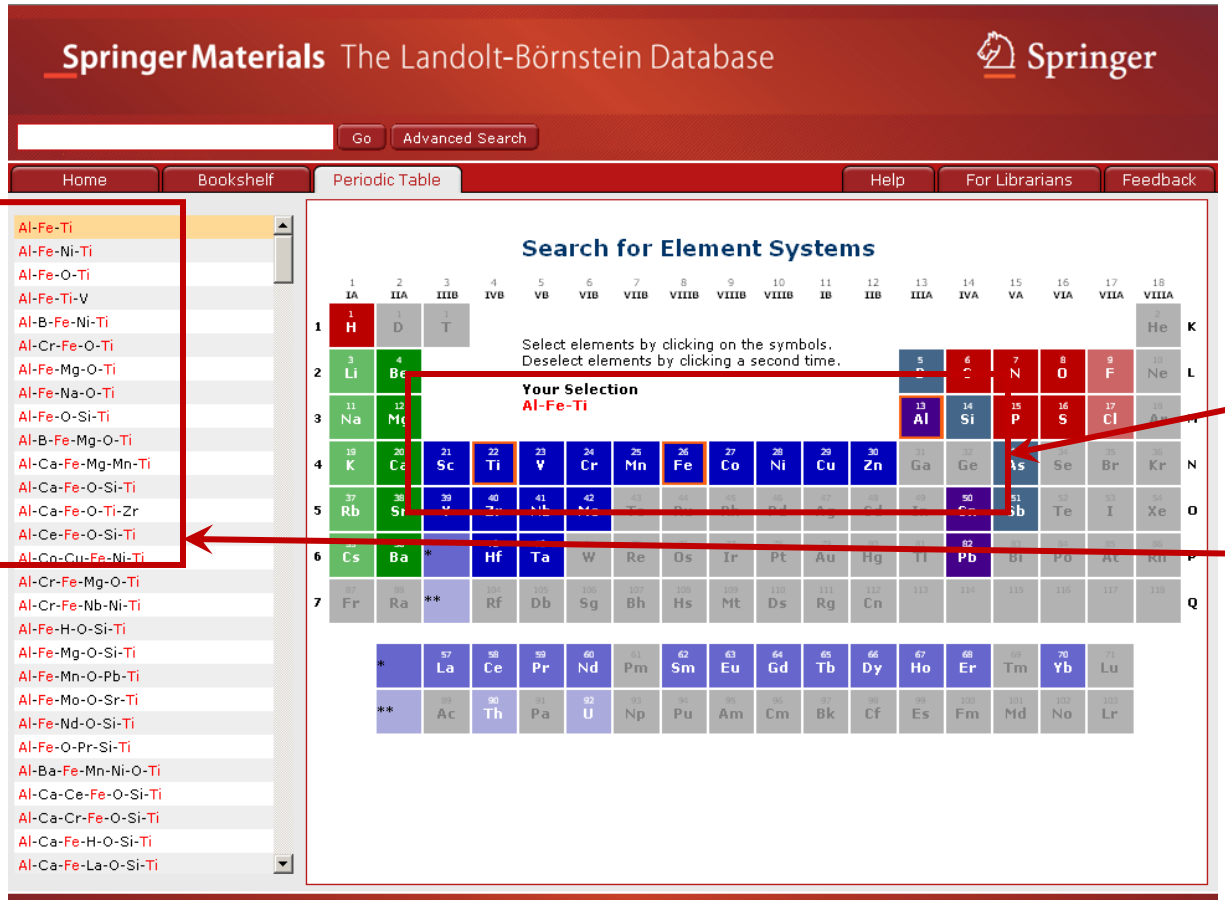

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2. Available content shown

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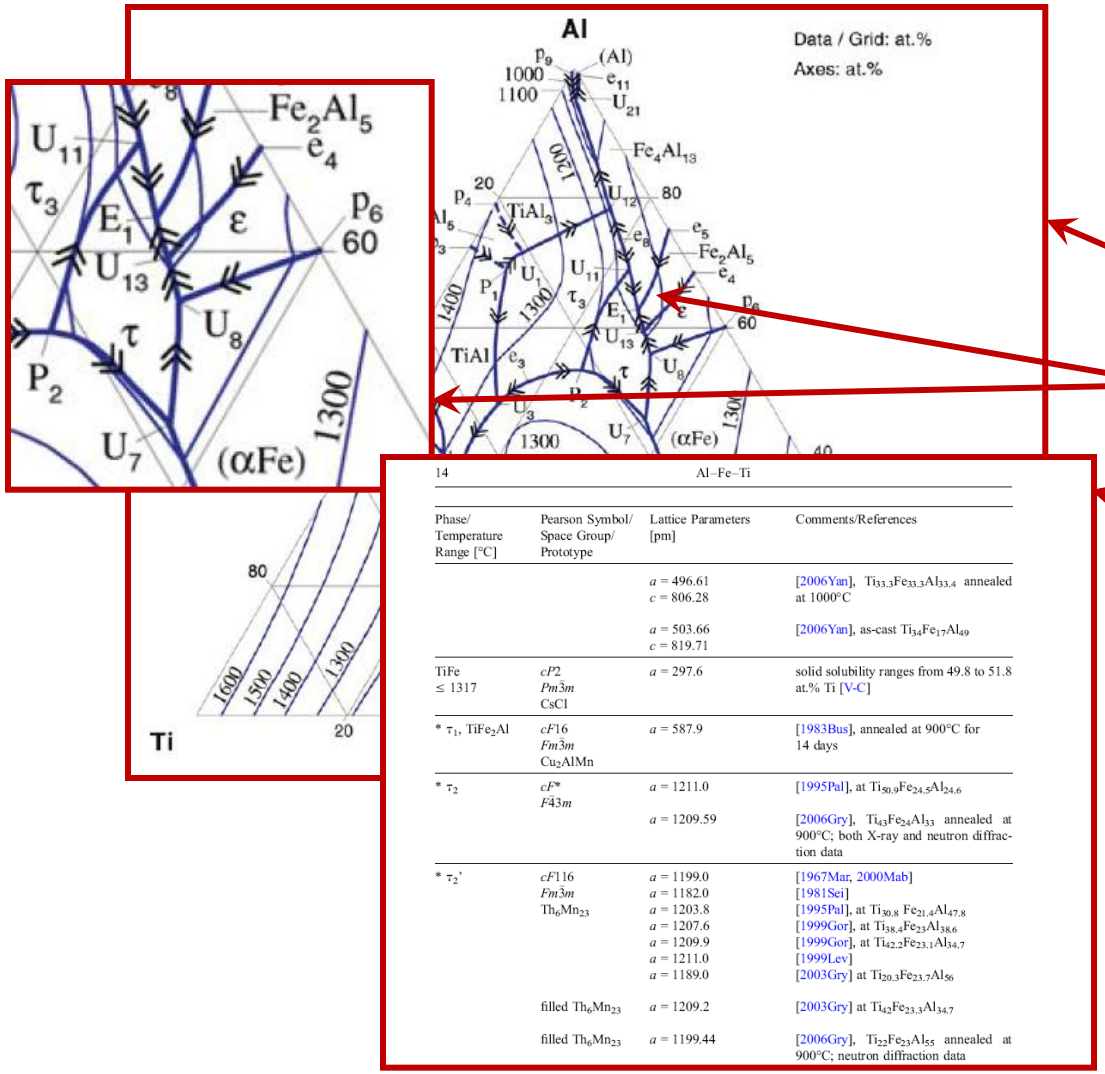

Phase/ Temperature Range [°C]	Pearson Symbol/ Space Group/ Prototype	Lattice Parameters [pm]	Comments/References
		a = 496.61 c = 806.28	[2006Yan], $Ti_{33.3}Fe_{33.3}Al_{33.4}$ annealed at 1000°C
		a = 503.66 c = 819.71	[2006Yan], as-cast $Ti_{34}Fe_{17}Al_{49}$
TiFe ≤ 1317	*cP*2 *Pm*$\bar{3}$*m* CsCl	a = 297.6	solid solubility ranges from 49.8 to 51.8 at.% Ti [V-C]
* τ_1, $TiFe_2Al$	*cF*16 *Fm*$\bar{3}$*m* Cu_2AlMn	a = 587.9	[1983Bus], annealed at 900°C for 14 days
* τ_2	*cF** *F*$\bar{4}$3*m*	a = 1211.0	[1995Pal], at $Ti_{50.9}Fe_{24.5}Al_{24.6}$
		a = 1209.59	[2006Gry], $Ti_{43}Fe_{24}Al_{33}$ annealed at 900°C; both X-ray and neutron diffraction data
* τ_2'	*cF*116 *Fm*$\bar{3}$*m* Th_6Mn_{23}	a = 1199.0 a = 1182.0 a = 1203.8 a = 1207.6 a = 1209.9 a = 1211.0 a = 1189.0	[1967Mar, 2000Mab] [1981Sei] [1995Pal], at $Ti_{30.8}Fe_{21.4}Al_{47.8}$ [1999Gor], at $Ti_{38.4}Fe_{23}Al_{38.6}$ [1999Gor], at $Ti_{42.2}Fe_{23.1}Al_{34.7}$ [1999Lev] [2003Gry] at $Ti_{20.3}Fe_{23.7}Al_{56}$
	filled Th_6Mn_{23}	a = 1209.2	[2003Gry] at $Ti_{42}Fe_{23.3}Al_{34.7}$
	filled Th_6Mn_{23}	a = 1199.44	[2006Gry], $Ti_{22}Fe_{23}Al_{55}$ annealed at 900°C; neutron diffraction data

1. Opens phase diagram
2. Selects desired material from diagram
3. Collects desired materials properties

Chemical reactor burst due to high vapor pressure

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Ref. p. 12] 1 Introduction 7

1.3.2 Empirical Vapor Pressure Equations

During the past century many empirical mathematical functions have been used to relate vapor pressure to temperature; most are modifications of Eq. (1.7). These functions have several parameters that are characteristic of the compound. Curve fits off experimental data, usually by minimizing the sum of the squares of the deviations between the calculated and observed pressures or temperatures (least squares criterion), provide these parameters. The first and most widely used of these equations is the Antoine equation [1888-ant, 46-tho]. The original form is,

$$\log P = A - B\,(C + T)^{-1} \qquad (1.8)$$

Sometimes the natural logarithm is used instead of the base-10 logarithm or Celsius temperature is used instead of Kelvin. When C = 0 (for T in kelvins) Eq. (1.8) is identical to Eq. (1.7). The *Thermodynamics Research Center Thermodynamic Tables - Hydrocarbons* [xx-trchc] *and Nonhydrocarbons* [xx-trcnh] - use an extended version of the Antoine equation:

$$\log P = A - B\,(C + T)^{-1} + 0.43429\chi^{n} + E\chi^{8} + F\chi^{12} \qquad (1.9)$$

where n, E, and F are additional adjustable parameters. T_c is the critical temperature, T_0 the lower boundary temperature and $\chi = (T - T_0)/T_c$

Examples of functions obtained by adding terms to Eq. (1.7) are the polynomial in temperature used in the *International Critical Tables* [26-ano],

$$\ln P = A + BT^{-1} + CT + DT^{2}, \qquad (1.10)$$

the Chebyshev polynomial [70-ambcou]

$$T \ln P = a_0/2 + \sum_{s=1}^{l} a_s E_s(\chi) \qquad (1.11)$$

$$\chi = [2T - (T_{max} - T_{min})] / (T_{max} - T_{min}) \qquad (1.12)$$

in which $E_s(\chi)$ is a Chebyshev polynomial in χ of degree s (the advantage of this is that the E_s functions are orthogonal), the Kirchoff-Rankine equation [48-tho],

$$\ln P = A + BT^{-1} + C \ln T, \qquad (1.13)$$

(same form as Eq. (1.6)); the Planck-Riedel equation [48-plarie]

$$\ln P = A + BT^{-1} + C \ln T + DP^{6}, \qquad (1.14)$$

and the Frost-Kalkwarf equation [53-frokal]

$$\ln P = A + BT^{-1} + C \ln T + DPT^{-2} \qquad (1.15)$$

Another popular type of function is the Cox equation [36-cox]:

$$\ln (PP_0^{-1}) = A\,(1 - T_b T) \qquad (1.16)$$

where A is a function of temperature often taken to be

$$\ln A = a + bT + cT^{2} \qquad (1.17)$$

Wagner and others [70-wag, 73-wag-1, 77-wag, and 86-amb-1] have proposed a series of related equations. The simplest is

$$\ln (PP_c^{-1}) = (A\tau + B\tau^{1.5} + C\tau^{3} + D\tau^{6}) / T_r \qquad (1.18)$$

where $\tau = 1 - T/T_c$, P_c is the critical pressure and T_c is the critical temperature. One of the variations [76-wagewe] is:

$$\ln (PP_c^{-1}) = (A\tau + B\tau^{1.5} + C\tau^{3} + D\tau^{6} + E\tau^{9}) / T_r \qquad (1.19)$$

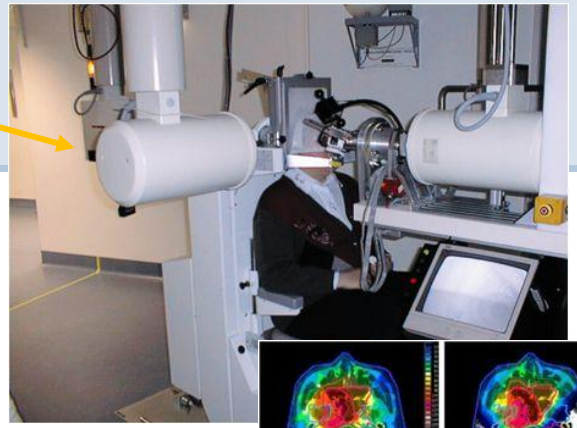
1. Read fundamentals
2. Select desired vapor pressure from table

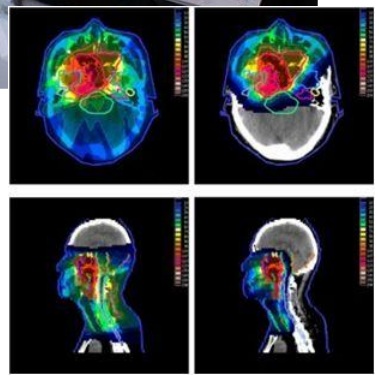
40 2.2 Hydrocarbons, C_8 to C_9 [Ref. p. 261

Phase	Antoine constants A, (n)	B [K], (E)	C [K], (F)	T-range [K]	Range [K], Rating	T_b[K]/P_b[kPa]	Ref. Note
387	**C_8H_{18}**		**Octane**				**111-65-9**
l-g	6.56398	1606.62	–42.89	217/294	216.4/294 B	398.83/101.325	90-trchc
l-g	6.05075	1356.36	–63.515	298/423	294/407 A		90-trchc
l-g	6.05075	1356.36	–63.515	423/568	407/568.4 B		90-trchc
	(2.86414)	(949.2)	(–73246)				
388	**C_8H_{18}**		**2,2,3,3-Tetramethylbutane**				**594-82-1**
cr-g	6.91839	1632.6	–46.09	252/372	242/374 B	379.44/101.325	90-trchc
l-g	5.9042	1270.1	–53.65	372/406	374/416 B		90-trchc
389	**C_8H_{18}**		**2,2,3-Trimethylpentane**				**564-02-3**
l-g	5.94826	1293.94	–54.795	284/408	270/400 A	382.99/101.325	90-trchc
l-g	5.94826	1293.94	–54.795	408/563	400/563.5 B		90-trchc
	(2.45345)	(162.4)	(–5383)				
390	**C_8H_{18}**		**2,2,4-Trimethylpentane**				**540-84-1**
l-g	6.35751	1447.78	–36.53	190/272	180/272 B	372.39/101.325	90-trchc
l-g	5.93646	1257.85	–52.383	272/398	272/400 A		90-trchc
l-g	5.93646	1257.85	–52.383	398/553	400/543.9 B		90-trchc
	(2.13261)	(134.5)	(12998)				
391	**C_8H_{18}**		**2,3,3-Trimethylpentane**				**560-21-4**
l-g	5.96421	1325.81	–52.989	287/408	277/402 A	387.92/101.325	90-trchc
l-g	5.96421	1325.81	–52.989	408/573	402/573.5 B		90-trchc
	(2.3793)	(76.3)	(1851)				
392	**C_8H_{18}**		**2,3,4-Trimethylpentane**				**565-75-3**
l-g	6.35762	1507.04	–38.35	216/298	205/298 B	386.62/101.325	90-trchc
l-g	5.977	1314.31	–55.669	298/408	298/400 A		90-trchc
l-g	5.977	1314.31	–55.669	408/566	400/566.4 B		90-trchc
	(2.39574)	(169.4)	(–4867)				
393	**C_9H_8**		**Indene, (1H-indene)**				**95-13-6**
l-g	6.34410	1749.215	–52.375	297/457	290/460 B	455.57/101.325	42-bur 61-stumco
394	**C_9H_{10}**		**Indan**				**496-11-7**
l-g	6.11230	1577.321	–66.828	375/465	370/470 A	450.92/101.325	81-hossco-1 78-osbsco
395	**C_9H_{10}**		**Isopropylbenzene**				**98-83-9**
l-g	7.13460	2234.172	–2.336	295/438	290/440 C	437.34/101.325	49-dremar 83-mutmur 47-stu
396	**C_9H_{10}**		**2-Methylstyrene**				**611-15-4**
l-g	6.27022	1624.066	–62.128	305/385	300/390 B	370.29/10	53-clewis
397	**C_9H_{10}**		**3-Methylstyrene**				**100-80-1**
l-g	6.36538	1682.941	–56.908	314/442	314/330 C, 330/445 B	442.93/101.325	49-buccol 53-clewis

R. Münz, S. Scherer

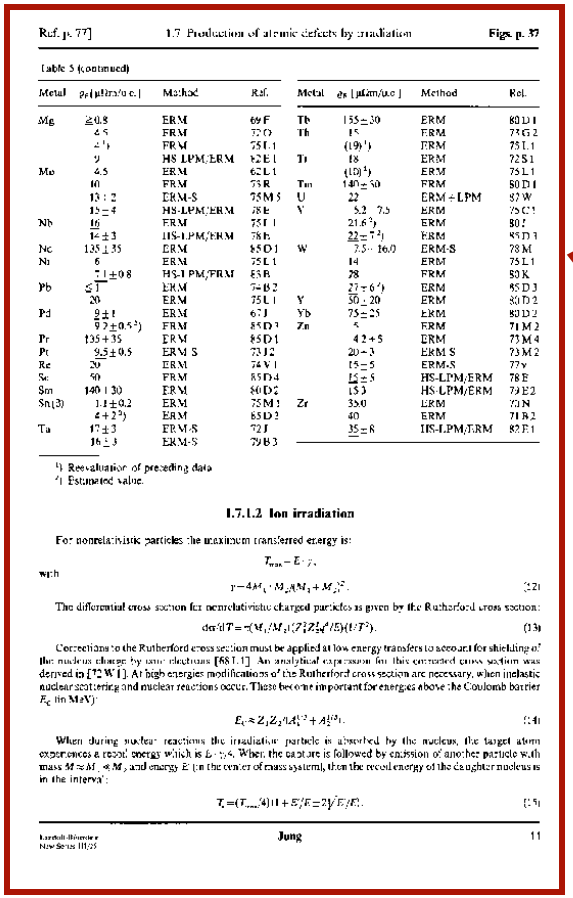
Manufacturer of medical equipment designs a new apparatus for tumor therapy





SpringerMaterials

Typical Usage Situation



Ref. p. 77] 1.7 Production of atomic defects by irradiation Figs. p. 87

Table 5 (continued)

Metal	σ_R [μbarn/at.c.]	Method	Ref.
Mg	≥0.8	ERM	69F
	4.5	ERM	72O
	4.1 b)	FRM	75L1
	9	HS-LPM/ERM	82E1
Mo	4.5	ERM	62L1
	10	FRM	75R
	13 ± 2	ERM-S	75M5
	15 ± 4	HS-LPM/ERM	78B
Nb	16	FRM	75L1
	14 ± 3	HS-LPM/ERM	78B
Nd	135 ± 35	ERM	85D1
Ni	6	ERM	75L1
	7.1 ± 0.8	HS-LPM/FRM	85B
Pb	≤7	ERM	74B2
	20	ERM	75L1
Pd	9 ± 1	ERM	67J
	9.2 ± 0.5 c)	FRM	85D3
Pr	135 ± 35	ERM	85D1
Pt	9.5 ± 0.5	ERM-S	73J2
Re	20	ERM	74V1
Sc	50	FRM	85D4
Sm	140 ± 30	ERM	80D2
Sn(3)	1.1 ± 0.2	ERM	75M3
	4 + 2 b)	ERM	85D2
Ta	17 ± 3	ERM-S	72J
	16 ± 3	ERM-S	79B3
Tb	155 ± 30	ERM	80D1
Th	15	ERM	73G2
	(19) b)	FRM	75L1
Ti	18	ERM	72S1
	(10) b)	ERM	75L1
Tm	140 ± 50	FRM	80D1
U	22	ERM + LPM	87W
V	5.2 7.5	ERM	75C3
	21.6 b)	ERM	80J
	22 ± 7 b)	ERM	85D3
W	7.5 16.0	ERM-S	78M
	14	ERM	75L1
	28	FRM	80K
	27 ± 6 b)	ERM	85D3
Y	30 ± 20	ERM	80D2
Yb	75 ± 25	ERM	80D2
Zn	5	FRM	71M2
	4.2 ± 5	ERM	73M4
	20 ± 3	ERM-S	73M2
	15 ± 5	ERM-S	77Y
	15 ± 5	HS-LPM/ERM	78E
	15 5	HS-LPM/ERM	79E2
Zr	35.0	ERM	70N
	40	ERM	71B2
	35 ± 8	HS-LPM/ERM	82E1

b) Re-evaluation of preceding data
c) Estimated value.

1.7.1.2 Ion irradiation

For nonrelativistic particles the maximum transferred energy is:

$$T_{max} = E \cdot \gamma,$$

with

$$\gamma = 4M_1 \cdot M_2/(M_1 + M_2)^2. \quad (12)$$

The differential cross section for nonrelativistic charged particles is given by the Rutherford cross section:

$$d\sigma/dT = \pi(M_1/M_2)(Z_1^2 Z_2^2 e^4/E)(1/T^2). \quad (13)$$

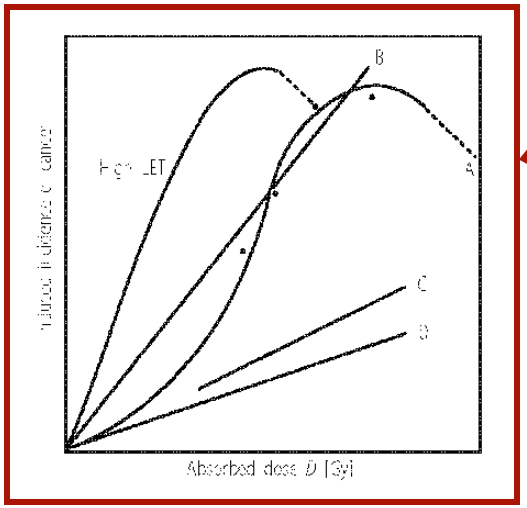
Corrections to the Rutherford cross section must be applied at low energy transfers to account for shielding of the nucleus charge by atomic electrons [68L1]. An analytical expression for this corrected cross section was derived in [72 W1]. At high energies modifications of the Rutherford cross section are necessary, when inelastic nuclear scattering and nuclear reactions occur. These become important for energies above the Coulomb barrier E_c (in MeV):

$$E_c \approx Z_1 Z_2 / A_1^{1/3} + A_2^{1/3}). \quad (14)$$

When during nuclear reactions the irradiative particle is absorbed by the nucleus, the target atom experiences a recoil energy which is $E \cdot \gamma/4$. When the capture is followed by emission of another particle with mass $M \approx M_1 + M_2$ and energy E (in the center of mass system), then the recoil energy of the daughter nucleus is in the interval:

$$T_r = (T_{max}/4)(1 + E'/E \mp 2\sqrt{E'/E}). \quad (15)$$

Landolt-Börnstein New Series III/25 Jung 11



1. **Read fundamentals**
2. **Search for data about high-energy precision irradiation**
3. **Check the response of biological material in relation to the applied dose**

Thank you !

Stay tuned !

Backup Slides

user:	researcher, engineer
field of activity:	medical research and application
sample task:	design of appropriate devices and beam lines within an tumor treatment installation
SpringerMaterials usage:	type in easy search box: "ion irradiation"
result:	first hit: overview of the physical concepts and relevant quantities with respect to prominent particles.
volume:	LB III/25

The information about ion irradiation enables any engineer or medical physicist to design and implement appropriate accelerators and beam lines. For that he has to know the energy loss and damage rates of protons, for example, as described in vol. LB III/25. With 'ion irradiation' typed into the easy-search field he obtains the needed information.

user:	scientist
field of activity:	chemical analysis
sample task:	measuring by NMR spectroscopy the chemical shift of the material to be analyzed and comparing it with the chemical shift of the expected material $C_9H_{14}N_2$
SpringerMaterials usage:	type in "C9H14N2 chemical shift" into easy-search box; select "Chemical shifts and coupling constants of C9H14N2"
result:	hit: "$C_9H_{14}N_2$" contains the desired data
volume:	LB III/35D3

A chemical analyst shall find out if the material to be analyzed is the expected material $C_9H_{14}N_2$. He uses NMR spectroscopy for this task and likes to compare the measured chemical shift with the chemical shift of $C_9H_{14}N_2$. For this he types "C9H14N2 chemical shift" into the easy-search box and selects "Chemical shifts and coupling constants of $C_9H_{14}N_2$", the hit "C9H14N2" contains the desired data.

user:	researcher, engineer
field of activity:	sensor development
general task:	design of a flame sensor
sample task 1:	get an overview on pyroelectricity
SpringerMaterials usage:	type "pyroelectric effect" into easy-search box
result:	3rd hit: "Pyroelectric equations of state and definition of pyroelectric coefficients"
volume:	LB III/29B
sample task 2:	get suitable materials
SpringerMaterials usage:	type "pyroelectric coefficient" into Advanced Search Properties box
result:	91 hits in electronic "Structure Structure and Transport", mostly substances
volume:	LB III/29B, III/36B

A researcher or an engineer in a department for sensor development wants to design a new flame sensor. First, he might wish to refresh his knowledge on pyroelectricity. He types “pyroelectric effect” in the easy search. The third hit leads him to a chapter on fundamentals in volume III/29B. After reading, he wants to find suitable materials, for which he goes to the Advanced Search and types “pyroelectric coefficient” into the Properties search field. He receives a lot of documents about relevant materials and will then be able to choose the best by comparing their pyroelectric coefficients.

Magnetism

user:	researcher, engineer
field of activity:	permanent magnet development
sample task:	get an overview of materials with magnetic hysteresis
SpringerMaterials usage:	type "magnetic hysteresis" into easy-search box
result:	51 hits in "Magnetism"
volume:	LB III/27, III/19

A company wants to develop permanent magnets for special applications defined by the company's customers. A researcher/engineer of the development department gets the job to gather information for suitable materials. He/she types "magnetic hysteresis" into the easy-search box and gets a list of materials which show magnetic hysteresis. This list may be used to continue search for special materials suitable for the customer's needs.

Semiconductivity

Springer
the language of science

user:	researcher, engineer
field of activity:	Photovoltaics
task:	• design of a solar cell prototype • gain of overview on the state of knowledge of the underlying physical concepts • test of a suitable new material; information about this material's properties
SpringerMaterials usage:	type in "photovoltaic cell" into easy-search box; select "photovoltaic power generation"
result:	first hit: overview of current established state of concepts and techniques around solar cells ; selection of $CuGaSe_2$ as material of interest
SpringerMaterials usage:	type in "CuGaSe2" into substance-box under 'Advanced Search', "band energy" into property-box
result:	first hit: data around $CuGaSe_2$ needed to project a solar device (e.g. suitability to absorb light dependent on temperature, cf. Fig. 3)
volume:	LB III/41E
SpringerMaterials usage:	alternatively type in "CuGaSe2" into substance-box under 'Advanced Search', "mobility" into property-box
result:	first hit: data of the charge carriers of $CuGaSe_2$, in particular mobility and concentration
volume:	LB III/41E

Semiconductivity (continued)

A solar technician, employed to find a material system for a new photovoltaic cell, might type 'photovoltaic cell' simply into the SpringerMaterials easy-search template, resulting in a first hit in a document about 'photovoltaic power generation'. From that he gains a comprehensive overview about the concepts and techniques around solar cells. He might learn from the document that $CuGaSe_2$ may be a suitable material of choice for his intentions. The amount of the energy gap and particularly its behavior must therefore be known. He uses the 'Advanced Search', typing '$CuGaSe_2$' into the substance-field along with 'band energy' into the property-field. As a result SpringerMaterials offers as first hit a document that describes the data needed in the context of different other properties. Fig. 3 even displays the dependence of the band gap energy from the temperature.

He might be even interested in the carrier mobility within $CuGaSe_2$, typing in 'mobility' under 'property', thus ending up at a document about transport properties of that material with all relevant quantities.

Springer
the language of science

user:	researcher, engineer
field of activity:	accelerator design
task:	develop a superconducting magnet
task:	get the properties of wires of Nb_3Sn
SpringerMaterials usage:	type "Nb3Sn wire" into easy-search box
result:	26 hits in "Superconductivity"
volume:	LB III/21

A research institute is designing a new particle accelerator which allows to accelerate particles like protons or heavy ions to increasingly higher energy before they hit each other. This can be achieved in circular accelerators provided the magnets used to bent the particle beam sustain a sufficiently high magnetic field. It is known that superconducting Nb_3Sn would be a suitable material. As the magnet would be made of wires the researcher/engineer types "Nb3Sn wire" into the easy-search box to get documents which provide information on the properties of wires of Nb_3Sn.

user:	engineer
field of activity:	electronic engineering industry
task:	miniaturization of storage elements
SpringerMaterials usage:	type in easy-search box: "Ba-ferrite magnetic recording"
result:	first hit: overview and suitability of a series of Ba-ferrites in the realm of magnetic recording is presented, along with properties
volume:	LB III/27G
SpringerMaterials usage:	'Advanced Search', type in substance-box: "Ba-ferrite", in property-box "crystal structure"
result:	first hits: data on the crystal structure of Ba-ferrites with further references
volume:	LB III/7 (possibly f)
result:	when selecting 'Inorganic Solid Phases' (LPDF-database) even more precise data are accessible
volume:	LPF Database

An electronic engineer might strive to enhance the storage capacity of hard disks. To minimize its spatial dimensions the magnetic behavior of hexagonal ferrites are of interest, for instance barium-ferrite. When typing 'Ba-ferrite' into the 'substance'-field and 'crystal structure' into the property-field he obtains as first hit information about the crystal structure and its behavior under different circumstances. When selecting 'Inorganic Solid Phases' he is offered even more precise data. When typing 'Ba-ferrite' along with 'magnetic recording' an overview of hexagonal ferrites is displayed as first hit, that are of interest as possible recording devices.

user:	researcher, scientist
field of activity:	scientific investigation of impurities within a semiconductor
task:	design of an annealing-installation for semiconductor after implantation of atoms under inert gas flow; choice: Argon gas mixture
SpringerMaterials usage:	under 'Advanced Search' type in "Argon" into the substance-box and "virial coefficient" into the property-box
result:	first hit: overview of several gas mixtures containing Ar with the corresponding virial coefficients
volume:	LB IV/21B

For any engineer or scientist in a laboratory concerned with the production of technical material, a major means to alter the material's microstructure is annealing. In order to avoid unintentional absorption of foreign material from the surrounding ('extrinsic defects') the process takes place in inert gas atmosphere. Argon, and mixtures with other gases, is a widely used representative gas.
The knowledge of the virial coefficients allows the exact calculation of the gas pressure, for example, if a certain temperature is required and volume given.
By using the 'Advanced Search' and typing 'Argon' into the substance-field, 'virial coefficient' into the property-field, the user gets as first hit a list of these properties for several mixtures of Argon (LB IV/21B).

user:	researcher, engineer
field of activity:	health risk assessment
task:	get information on Pu alloys and compounds
task:	get all available phase diagrams of compounds containing Pu
SpringerMaterials usage:	type "plutonium phase diagram" into easy-search box
result:	113 hits in "Multiphase Systems"
volume:	LB IV/5, IV/11

For a nuclear power plant to be built a national health institute or engineering company has to assess the health risk to the employees of the power plant and the people living in its neighborhood that would result from a malfunctioning of the power plant. To this end knowledge of the properties of plutonium (one of the most hazardous materials) and plutonium-containing compounds is of paramount importance. Phase diagrams of plutonium compounds allow to determine which compounds might possibly be generated under the conditions of operation of the power plant. Therefore the researcher/engineer types "plutonium phase diagram" into the easy-search box. Similarly the phase diagrams of other hazardous materials may be found.

Springer
the language of science

user:	researcher, engineer
field of activity:	displays
task:	reducing the switching time of a liquid crystal display
SpringerMaterials usage:	type in "liquid crystal switching time" into easy-search box
result:	first hit: “liquid crystals - definition of properties” – An overview on all properties is given here. Search “switching time” in this document. – The researcher finds out: “It is desirable to have substances with low viscosity for application in a LC cell.”
volume:	LB VIII/5A
task:	Now the researcher likes to get viscosity data of liquid crystals.
SpringerMaterials usage:	type in “liquid crystal viscosity” into easy-search box.
result:	first hit: “liquid crystals - definition of properties” (as above), second hit: “liquid crystals – introduction” – In this file the arrangement of the data files is explained. hit 8: “Data ordered by properties > Viscosity” contains the desired data.
volume:	VIII/5Ae2

A researcher has the task to reduce the switching time of a liquid crystal display. He first likes to find out on which properties the switching time depends and types in “liquid crystal switching time” into the easy-search box. The first hit is a document giving an overview over all properties of liquid crystals. By searching “switching time” in this document the researcher finds out that it is desirable to have substances with low viscosity. He now searches for “liquid crystal viscosity” and finds an introduction where the arrangement of the data files on liquid crystals is explained and a data file “Data ordered by properties – Viscosity” which contains the desired viscosity data.

Springer
the language of science

user:	scientist, engineer
field of activity:	laser processing
task:	- metal sheet cutting - gain of overview on the state of knowledge
SpringerMaterials usage:	type in "cutting" into easy-search box; select "cutting"
result:	first hit: "Cutting: Modeling and data" - overview on the state of knowledge
volume:	LB VIII/1C

A scientist/an engineer working in the field of laser processing likes to gain an overview on metal sheet cutting. He simply types in “cutting” into the easy-search box. The first hit is the desired overview article “Cutting: Modeling and data”.

Springer
the language of science

user:	astronomer, researcher, engineer
field of activity:	observatory
task:	find information about observed asteroid
SpringerMaterials usage:	type in "asteroid" into easy-search box; select "asteroid"
result:	first hit: “Astronomy and Astrophysics before 1993” is not the correct one, as mainly actual information is searched for; second hit: “The asteroids” gives an overview on asteroids
volume:	LB VI/4B

An astronomer or a scientist interested in astronomy who has observed an asteroid wants to find information about asteroids. In Landolt-Börnstein an overview on asteroids is given.

user:	scientist, researcher, engineer
field of activity:	researcher in optics industry
task:	design of an infrared detector
SpringerMaterials usage:	type in 'Advanced Search' into substance-box "InSb" and "energy gap" into property-box; select LPF Database by marking the corresponding box to the left
result:	first hit yields all LPF-data sheets on InSb containing physical property; click first hit; seventh hit from top: overview of the physical concepts and relevant quantities with respect to prominent particles.
volume:	LPF Database

A researcher in the optics industry wants to design a new infrared detector. He knows that an indium antimony alloy is a possible material and needs to find data about the energy gap of this material. E.g., he uses the substance-property search in the Advanced Search section. The first hit leads to the summary document of the InSb entry in the LPF database, then the seventh hit from top contains the data on the energy gap.

Thermophysical Properties

Springer
the language of science

user:	researcher, engineer
field of activity:	chemical engineering
task:	calculate the freezing point depression of ethanol/water mixtures
task:	get the thermophysical properties of ethanol/water mixtures
SpringerMaterials usage:	choose "Thermophysical Properties", type "ethanol" and choose "ethanol + water"
result:	1 hit in "Thermophysical Properties"
volume:	Dortmund Data Bank

A car manufacturer wants to provide information in the cars' manuals on how much ethanol is to be used in ethanol/water mixtures so that the mixture does not freeze even in strong winters and can be still applied for cleaning the window panes.
To give such an advice the freezing point of ethanol/water mixtures has to be calculated in dependence on the ethanol content. The researcher/engineer types "ethanol" and chooses "ethanol + water" in the input box of the Thermophysical Properties subject area.
From the thermophysical data provided the depression of the freezing point by adding ethanol to water can be calculated by the researcher/engineer.

Current additional Database Content

Springer
the language of science

Inorganic Solid Phases

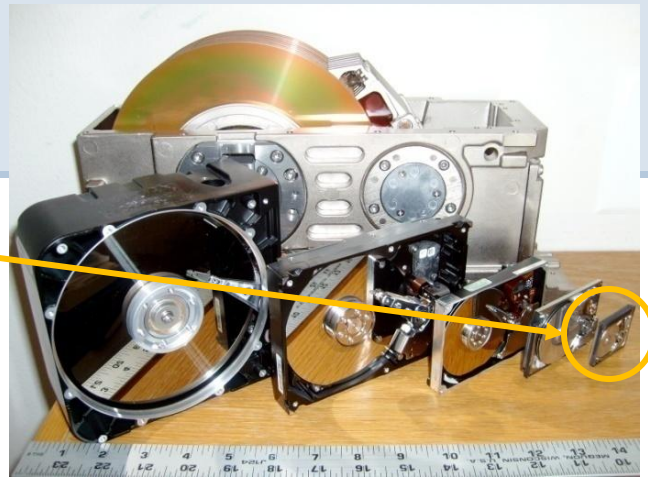
- The database on Inorganic Solid Phases contains all necessary data for any researcher or scientist dealing with materials in their solid form. It provides information about the regions and conditions of their existence (phase diagrams), their crystallographic and geometric structure (structural data) and their physical properties (property data).

Thermophysical Properties

- Thermophysical data of pure organic substances as well as mixtures consisting of an organic substance and water, or two organic substances, are represented in tables and diagrams. Chemical engineers are able to design and develop chemical reactors and plants if they know the thermophysical properties of the substances used in these reactors and plants. The data is also useful for (organic) chemists in research laboratories.

Springer
the language of science

Engineer develops smaller hard disk with higher memory capacity



SpringerMaterials

Typical Usage Situation

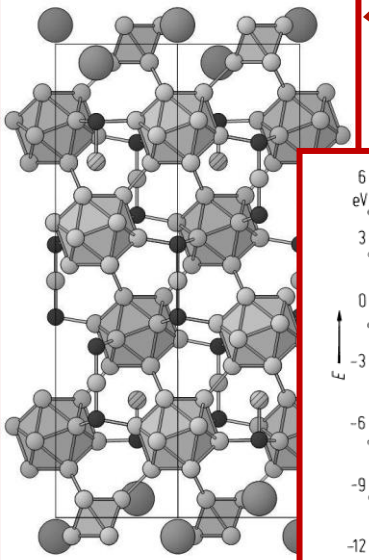
Ref. p. 216] 6.3.11 Magnetic recording applications of hexagonal ferrites 209

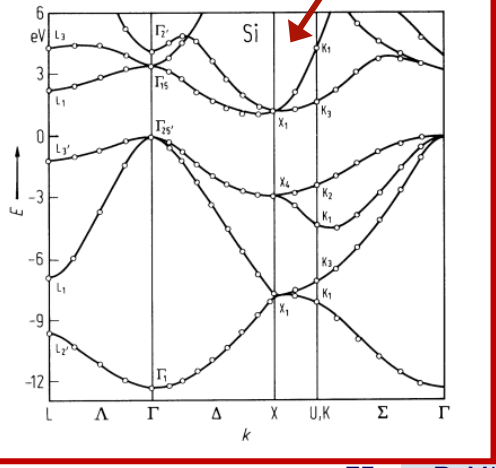
6.3.11 Magnetic recording applications of hexagonal ferrites

Table 32.

Device	Ref.	Remarks	Fig./Table
recording (general)	85F1	survey of applications of Ba-ferrite media to perpendicular recording devices	
recording (general)	85F2	review on the potential application of Ba-ferrite media for perpendicular magnetic recording	123, 124
recording (general)	85I4	development of Ba-ferrite particulate media for perpendicular recording applications	
recording (general)	85M1	Ba-ferrite media for perpendicular recording, recording density vs. degree of orientation, thermal stability	
recording (general)	85Y3	development of Ba-ferrite particulate media for application to VCRs, VTRs, DATs and high density floppy disks	
recording (general)	86I1	achievements in magnetic recording applications of Ba-ferrite in Japan	
recording (general)	87F1	Ba-ferrite particulate media for perpendicular recording, output level vs. particle aspect ratio and size distribution	125
recording (general)	87P	dynamic model for simulating the magnetic recording processes, application to Ba-ferrite media	
recording (general)	87S2	recording characteristics of oriented and non oriented Ba-ferrite media	
recording (general)	87S3	comparative analysis of particulate media for magnetic recording vs. particle and coating characteristics	
recording (general)	88S7	comparison between Ba-ferrite and Co-γ-Fe_2O_3 films (0.25 μm thick), Ba-ferrite media show the highest linear density (> 1400 fc/mm) and a very sharp distribution of remanent coercivity	
recording (general)	88S3	analysis of possible solutions to overwrite modulation in Ba-ferrite particulate media	
recording (general)	89W2	application of dynamic micromagnetic theory to signal and noise problem in Ba-ferrite media	
developer for electro-photography	83I	Ba(Ni, Zn)-Y ferrite as carrier for dual component developer	
duplicator for R-DAT	86N	Ba-ferrite media for magnetic contact duplication at λ from 0.6 to 40 μm, track width from 10 to 20 μm, block error rate $< 5 \cdot 10^{-3}$	
floppy disk	85F3	Ba-ferrite perpendicular recording media, 3.5" FD, endurance test	
floppy disk	85I1	Ba-ferrite perpendicular recording media, 3.5" 4 MB FD, recording density = 35 kBPI, track density = 135 TPI	Table K
floppy disk	85I2	Ba-ferrite perpendicular recording media, flexible disks for electronic still cameras (ϕ = 47 mm, 3600 rpm)	126
floppy disk	86Y	Ba-ferrite media (coating thickness 3 μm, $SQ_\perp$ = 0.54), high density recording response and over-write characteristics	

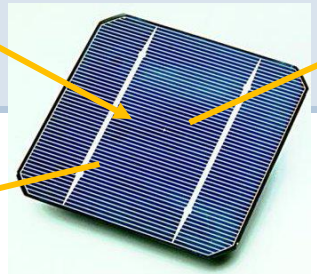
continued





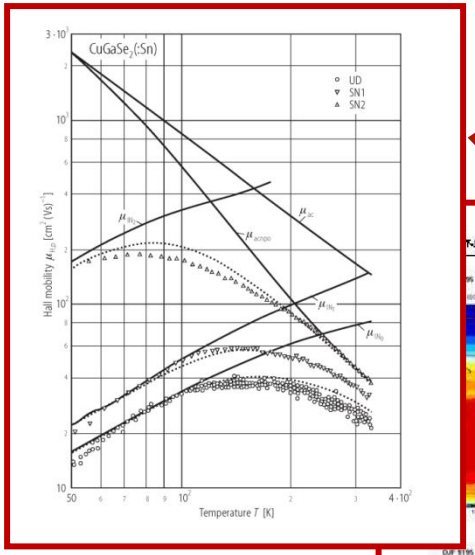
1. Search suited magnetic material
2. Get information about its molecular structure
3. Check its physical properties

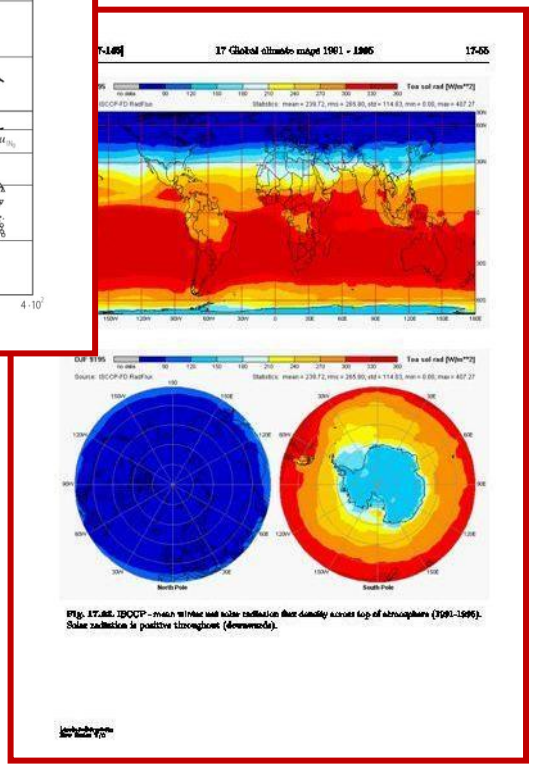
Engineer develops improved solar cell



SpringerMaterials

Typical Usage Situation





1. Search for the carrier mobility of CuGaSe2
2. Get an overview of the climate conditions in the area of interest

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Engineer needs to improve the corrosion resistance of car bodies: Steels coated with Al-Fe-Zn layer

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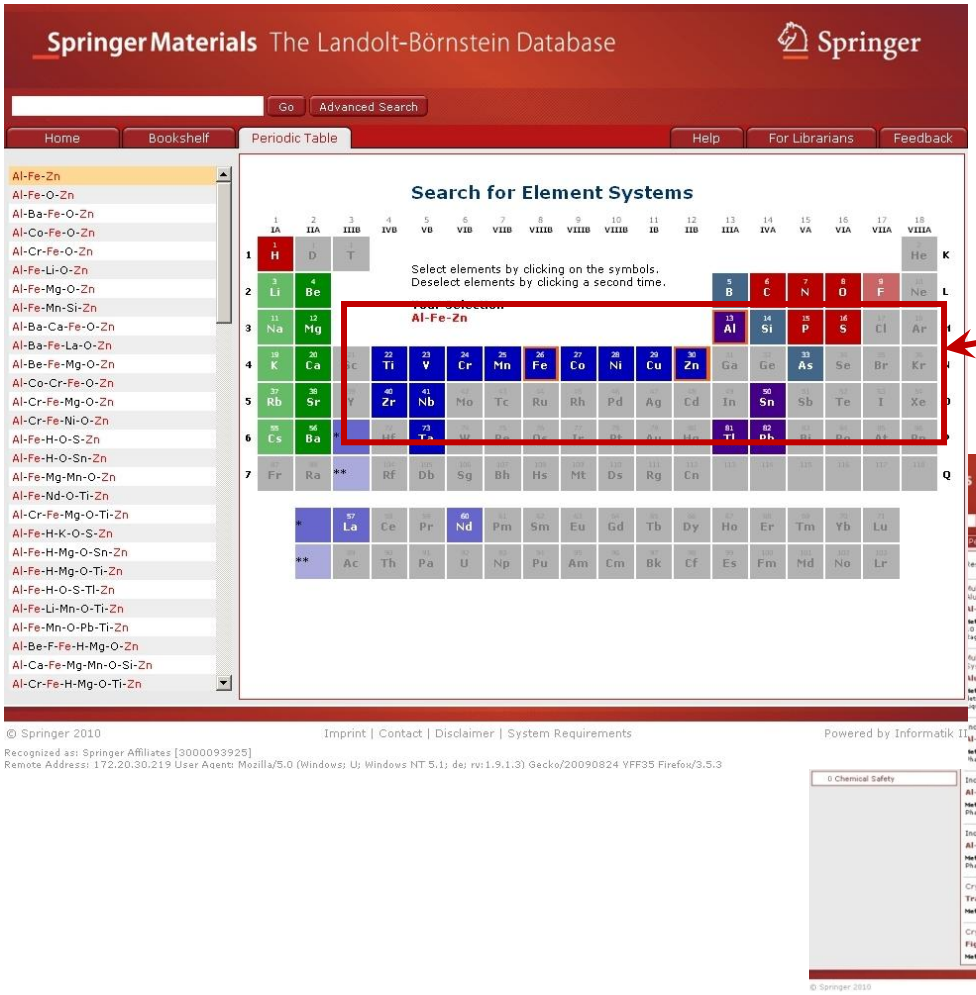
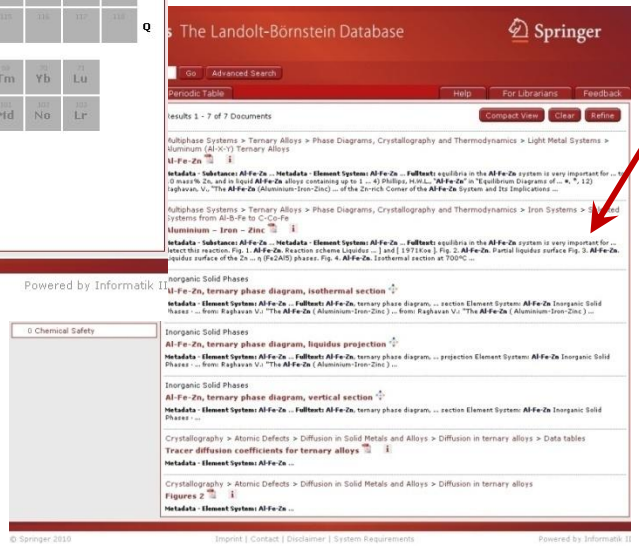
Typical Usage Situation





1. **Select components by clicking on elements in periodic table**
2. **Available content shown**

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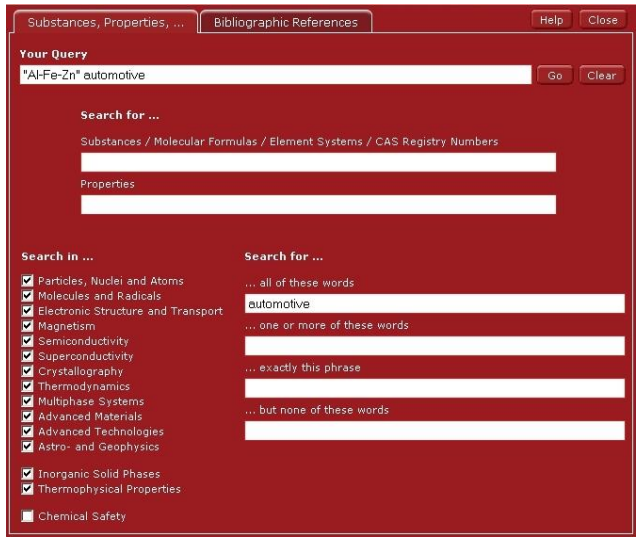
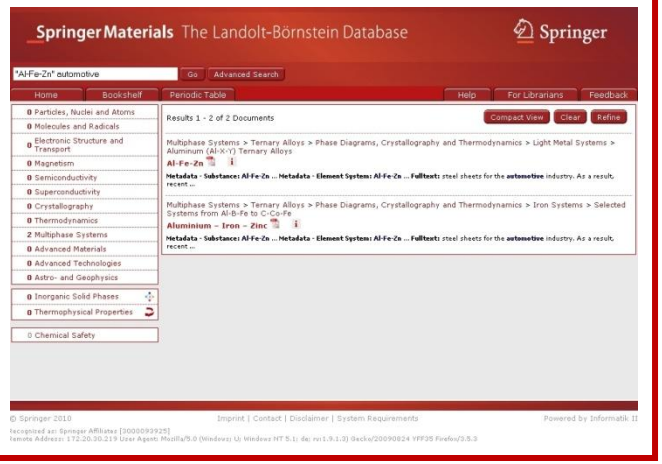
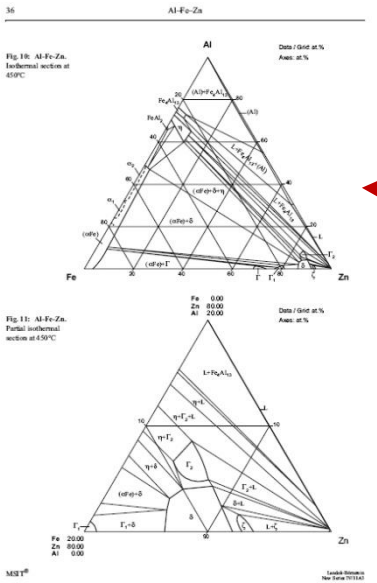
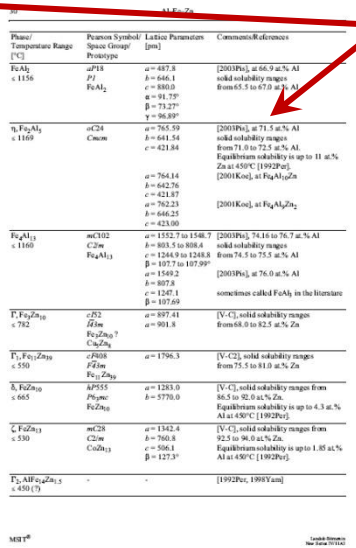








3. Refine search and check available content

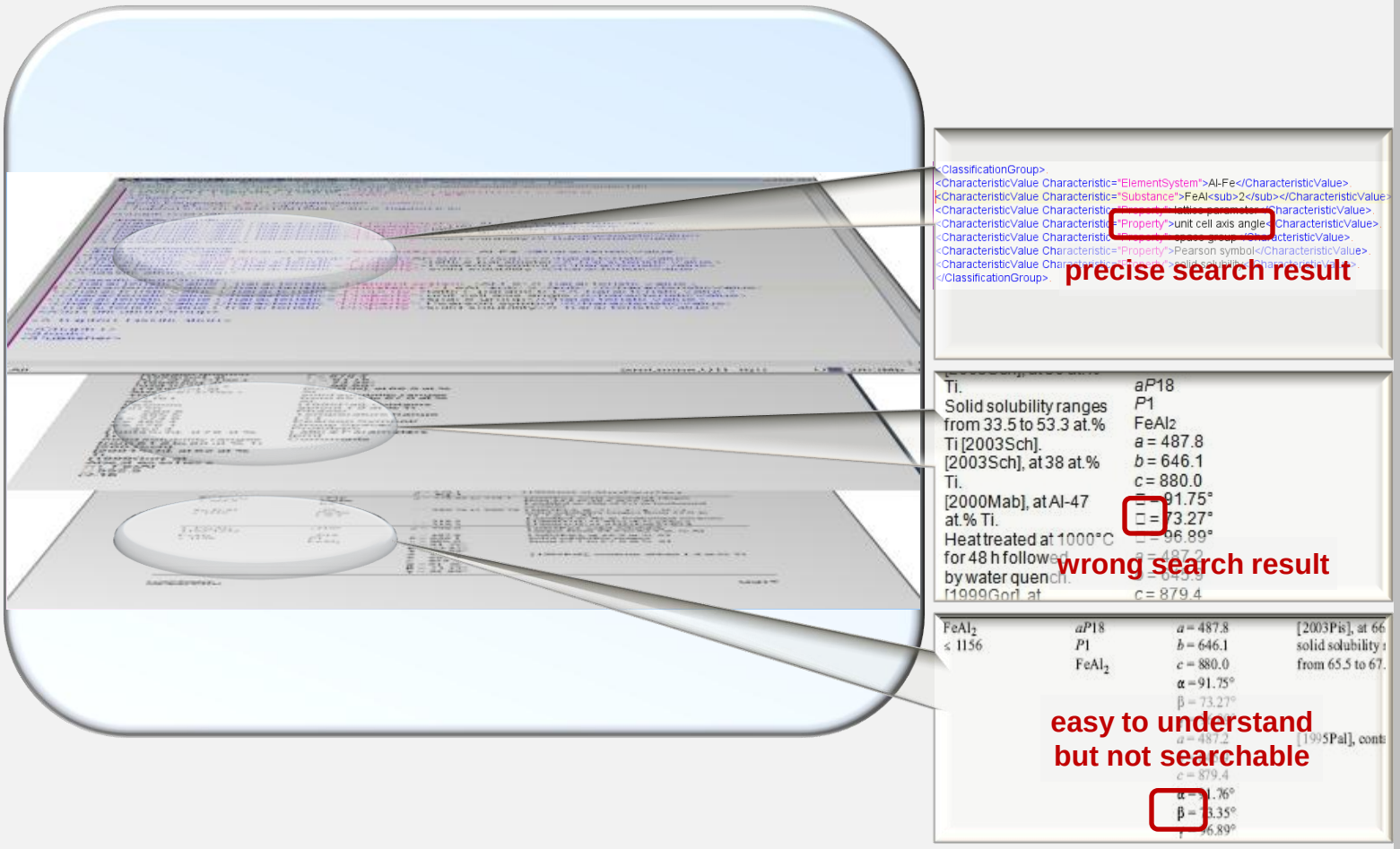
4. Check phase diagram and crystallographic data of the chosen composition

Three Layers per Doc

Summary

A Closer Look

Usability



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What the user can find with the SpringerLink search engine

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