

STN[®]

Materials Science Resources Forum
SLA 2008

Robert Austin – FIZ Karlsruhe

Agenda

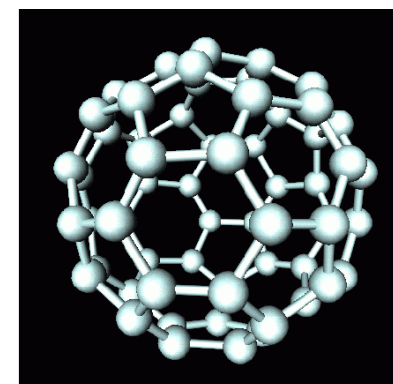
- The Inorganic Crystal Structure database (ICSD) produced by FIZ Karlsruhe*
- An overview of the various materials science databases available on STN
- Search example to highlight specialized fields in materials science databases

* In cooperation with the National Institute of Standards and Technology (NIST)

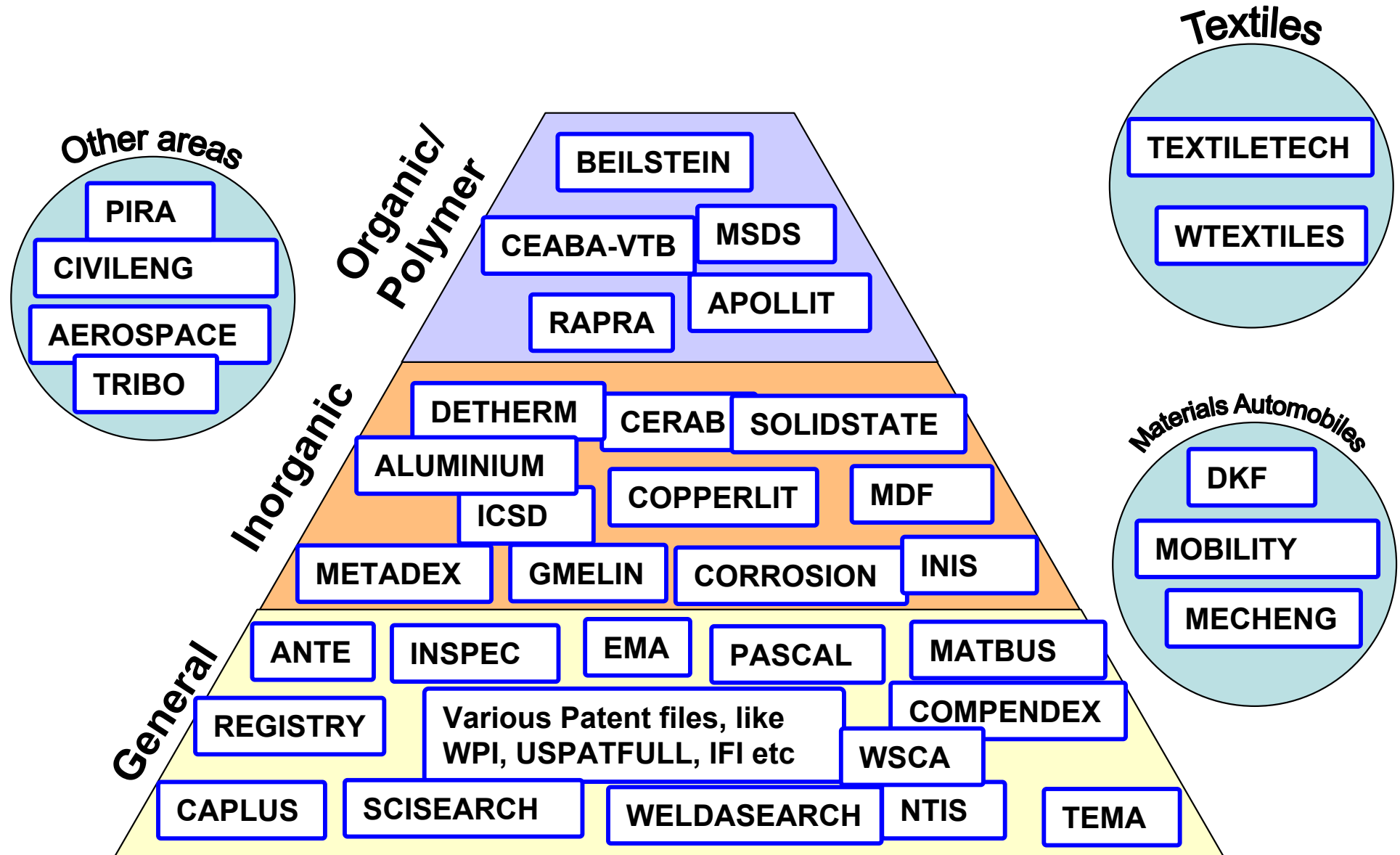
ICSD – the world's largest database for inorganic crystal structures

- Contains inorganic crystal structures published since 1913, including their atomic coordinates
- Structural data of pure elements, minerals, metals, and intermetallic compounds
- Structural descriptors (Pearson symbol, ANX formula, Wyckoff sequences)
- Evaluation and quality check by our expert editorial team
- Coverage of 80 leading scientific journals and additional 1,900 scientific journals
- Bibliographic data
- Synthesis conditions

More at: <http://www.fiz-karlsruhe.de/icsd.html>



STN offers many resources for finding information on Materials



How can materials be searched in bibliographic files?

- Search in the default Basic Index
- Search in specialized content fields
 - Provided by the database producers
 - Enhanced or added by FIZ Karlsruhe

Specialized search fields

Element Terms: **INSPEC, COMPENDEX** etc.

Chemical Indexing: **INSPEC** (s. appendix)

Alloy indexing: **METADEX** (s. appendix)

Trade Names/-Classific.: **EMA, WSCA** etc.

Thesauri : **RAPRA** etc.

Materials Composition: **REGISTRY (⇒CAPLUS)**

FIZ Karlsruhe adds the Element Terms (/ET) field to many databases covering materials

- Character-string-recognition algorithm scans title and abstract data for special characters or strings
- Generation of separate index field /ET during file loading process
- This algorithm recognizes and analyzes:
 - Chemical formulas
 - Material descriptions
 - Alloys and eutectic systems
 - Nuclear reactions, isotopes
 - Material dopings

Element Terms (/ET) field entries cover a variety of inorganic and organic systems

Entry in ET field	Definition
Ba cp	compounds
sy 3	Systems e.g. n=3 (n >= 2 metals, semimetals)
As*Ga	elements in Hill Order
Si:P, doped materials	material dopings, e.g. Phosphorus doping of silicon

STN databases which feature FIZ Karlsruhe assigned Element Terms (/ET) indexing

<u>STN File Name</u>	<u>Database Description</u>
CERAB	Ceramic Abstracts (1976-)
COMPENDEX	Ei COMPENDEX File (1970-)
EMA	Engineered Materials Abstracts File (1986-)
ENERGY	DOE ENERGY file (1974-)
INIS	International Nuclear Information System (1970-)
INSPEC	The Database for Physics, Electronics and Computing (1969-)
INSPHYS	INSPEC- PHYS Supplement Backfile (1979 - 1994)
MATBUS	Materials Business File (1983-)
METADDEX	Metals Abstracts/Alloy Index (1966-)

Learn more at: www.stn-international.com

Search example to highlight specialized fields in materials science databases

Search Question:

I would like to obtain an overview of references which describe tin oxide (SnO₂) nanowires.

Overall search strategy

- Step 1. Search in INSPEC:**
Controlled terms, Chemical Indexing and Element terms
- Step 2. Search in EMA:**
Controlled terms and Element terms
- Step 3. Search in COMPENDEX:**
Controlled terms and Element terms
- Step 4. Removal of Duplicates:**
DUPLICATE REMOVE

EMA = Engineered Materials Abstracts, produced by Cambridge Scientific Abstracts (CSA).

Search in INSPEC: Controlled terms, Chemical Indexing and Element terms

```
=> FILE INSPEC
```

```
=> E NANOWIRES/CT
```

E#	FREQUENCY	AT	TERM
--	-----	--	----
E1	1334	10	NANOTUBE DEVICES/CT
E2	2115	10	NANOTUBES/CT
E3	7658	16 -->	NANOWIRES/CT

ooo

INSPEC Controlled Terms (/CT) are a great way to find relevant records.

```
=> E E3+ALL
```

E13	1174	BT2	materials/CT
E14	62121	BT1	nanostructured materials
E15	7658	-->	nanowires/CT
		DA	January 2003
E16	483	RT	nanocontacts/CT
E17	1260	RT	quantum wires/CT
E18	7016	RT	semiconductor quantum wires/CT
E19	1450	RT	wires/CT
E20	62121	PT	nanostructured materials/CT

ooo

Explore the INSPEC controlled term thesaurus on STN, to find more related terms (RT).

INSPEC provides Chemical Indexing (CHI) options in addition to Controlled Terms (CT)

=> S E15 OR E17 OR E18 OR E21

7658 NANOWIRES/CT

1260 "QUANTUM WIRES"/CT

7016 "SEMICONDUCTOR QUANTUM WIRES"/CT

1260 "QUANTUM WIRES"/CT

L1 14803 NANOWIRES/CT OR "QUANTUM WIRES"/CT OR "SEMI
CONDUCTOR QUANTUM WIRES"/CT OR "QUANTUM WIRES"/CT

Including additional controlled terms enhances retrieval.

=> E SNO2/CHI

E29 2 SNO1.8:AG/CHI

E30 2 SNO1.8:AG SS/CHI

E31 5622 --> SNO2/CHI

E32 6 SNO2 ADS/CHI

ooo

INSPEC Chemical Indexing (/CHI).

=> E SN BIN/CHI

E41 39035 SN/CHI

E42 196 SN ADS/CHI

E43 16053 --> SN BIN/CHI

ooo

SN BIN = Binary system of Tin (Sn).

The FIZ Karlsruhe assigned Element Term (/ET) field may help find additional records

=> E SNO2/ET

```
E53          3      SNO1.8/ET
E54          2      SNO1.8:AG/ET
E55       7437 --> SNO2/ET
E56          1      SNO2 /ET
E57          2      SNO2 : F/ET
E58         157     SNO2 DOPING/ET
ooo
```

Use Expand to determine if the molecular formula of interest is present in the ET field.

=> S L1 AND (SNO2/CHI OR SNO2/ET) AND SN BIN/CHI

9958 NANOWIRE

(NANOWIRE OR NANOWIRES)

o o o

L2 115 L1 AND (SNO2/CHI OR SNO2/ET) AND SN BIN/CHI

The relevance of answers can be assessed by reviewing INSPEC titles and indexing

=> D TI IND 1 115

L2 ANSWER 1 OF 115 INSPEC (C) 2008 IET on STN

TI The effect of morphological modification on the electrochemical properties of SnO₂ nanomaterials

CT electrochemistry; ion exchange; nanoparticles; **nanowires**; semiconductor materials; semiconductor nanotubes; tin compounds

CHI **SnO2 bin, O2 bin, Sn bin, O bin**

ET O; Sn; O*Sn; **SnO2**; Sn cp; cp; O cp; D; Li; Li+; Li ip 1; ip 1

L2 ANSWER 115 OF 115 INSPEC (C) 2008 IET on STN

TI Synthesis of SnO₂ nanostructures by carbothermal reduction of SnO₂ powder

CT nanostructured materials; **nanowires**; semiconductor growth; solid-vapour transformations; tin compounds

CHI **SnO2 bin, O2 bin, Sn bin, O bin**

ET O₂; O; Sn; O*Sn; **SnO2**; Sn cp; cp; O cp; C

Search in EMA: Controlled terms and Element terms

=> FILE EMA

=> E NANOWIRES/CT

E65	87	NANOTRIBOLOGY/CT
E66	1547	NANOTUBES/CT
E67	1558	--> NANOWIRES/CT
E68	17	NAPHTHA/CT
E69	167	NAPHTHALENE/CT
ooo		

Several databases have CT and ET search options (see Appendix 1).

=> SET PLURALS ON

SET COMMAND COMPLETED

STN provides an option to automatically include plurals.

=> S (NANOWIRE OR NANO WIRE) AND (SNO2 OR SNO2/ET)

2082 NANOWIRE

(NANOWIRE OR NANOWIRES)

o o o

L3 53 (NANOWIRE OR NANO WIRE

Controlled Terms (CT) also form part of the default Basic Index.

Search in COMPENDEX: Controlled Terms and Element Terms, and then remove duplicates

=> **FILE COMPENDEX**

COMPENDEX also features Element Terms (ET) and Controlled Terms in the Basic Index.

=> **S (NANOWIRE OR NANO WIRE) AND (SNO2 OR SNO2/ET)**

10146 NANOWIRE

(NANOWIRE OR NANOWIRES)

o o o

L4 149 (NANOWIRE OR NANO WIRE) AND (SNO2 OR SNO2/ET)

=> **SET DUPORDER FILE**

SET COMMAND COMPLETED

=> **DUPLICATE REMOVE L2 L3 L4**

Precision removal of duplicates in the order of preferred databases: INSPEC (L2), EMA (L3) and COMPENDEX (L4).

L5 218 DUP REM L2 L3 L4 (99 DUPLICATES REMOVED)

ANSWERS '1-115' FROM FILE INSPEC

ANSWERS '116-143' FROM FILE EMA

ANSWERS '144-218' FROM FILE COMPENDEX

Review unique references from multiple databases in relevance ranked order

=> FOCUS L5

PROCESSING COMPLETED FOR L5

L6 218 FOCUS L5 1-

=> D TI 1-20

L6 ANSWER 1 OF 218 COMPENDEX COPYRIGHT 2008 EEI on STN

TI The synthesis and characterization of SnO₂ nano-wires.

L6 ANSWER 2 OF 218 EMA COPYRIGHT 2008 CSA on STN

TI On the Role of Oxygen Vacancies in the Determination of the Gas-Sensing Properties of Tin-Oxide Nanowires

L6 ANSWER 3 OF 218 COMPENDEX COPYRIGHT 2008 EEI on STN

TI Nanostructures and self-catalyzed growth of SnO₂.

L6 ANSWER 4 OF 218 INSPEC (C) 2008 IET on STN

TI Sensors based on nanotubes and nanowires: molecular modeling applications

o o o

Single and multi-database STN answer sets can be ranked by relevance using FOCUS.

Any selected answers of interest can be displayed in full using the ALL format

=> D ALL 1-4

L6 ANSWER 1 OF 218 COMPENDEX COPYRIGHT 2008 EEI on STN
AN 2007(48):9805 COMPENDEX [Full-text](#)
TI The synthesis and characterization of **SnO2 nano-wires**.
AU Xu, Bingshe (Taiyuan University of Technology, Taiyuan
030024, China); Li, Junshou; Li, Sanqun; Yin, Yujun
SO Xiyou Jinshu Cailiao Yu Gongcheng/Rare Metal Materials and
Engineering v 36 n SUPPL.2 August 2007 2007.p 492-495
CODEN: XJCGEA ISSN: 1002-185X
PY 2007
DT Journal
TC Experimental
LA Chinese
AB A new method of producing **SnO2 nano-wires** is reported,
which take thermit as crude materials basically, named
thermal explosive deforming synthesis (TEDS). It contained
two fundamental processes of self-propagating high-
temperature synthesis and thermal explosive deforming in
TEDS. A kind of viscid fluid **SnO2** is obtained in

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