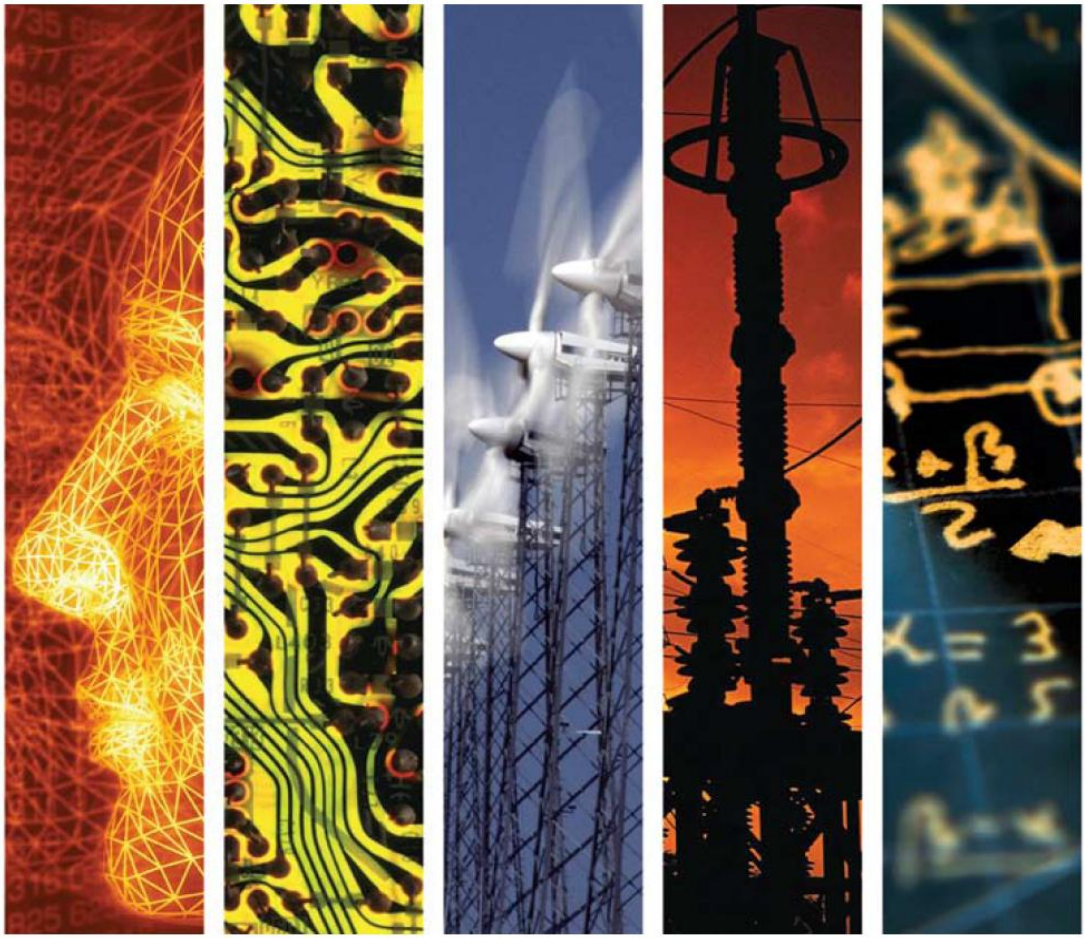
IET Inspec WEB OF KNOWLEDGE℠

User Guide
Web of Knowledge



www.theiet.org/inspec

Inspec on Web of Knowledge℠

INSPEC Database Overview

Inspec is the world's leading English-language information service providing access to the world's scientific and technical literature in *physics, electrical engineering, electronics, communications, control engineering, computing, information technology,* and *manufacturing and production engineering*. In addition to providing a comprehensive index to the literature from these disciplines, Inspec also has significant coverage in interdisciplinary areas such as *materials science, oceanography, nuclear engineering, geophysics, biomedical engineering* and *biophysics*.

The Inspec Database, which lies at the centre of this service, dates back to 1969, with over 5000 scientific and technical journals (online, print and open access) and more than 3000 conference proceedings and other publications scanned each year. The Database contains over 12 million bibliographic records, and is growing at the rate of approximately over 700,000 records each year. Each record in the Inspec database contains an English-language title and descriptive abstract, together with full bibliographic details which include the journal or other publication title, the author's name and affiliation and the language of the original document. All of these may be searched, as well as Inspec's extensive range of subject classification and indexing systems, which are recognised as the standard of excellence in search aids throughout the industry. These include controlled index terms from the Inspec Thesaurus, numerical data indexing, chemical substance indexing and astronomical object indexing.

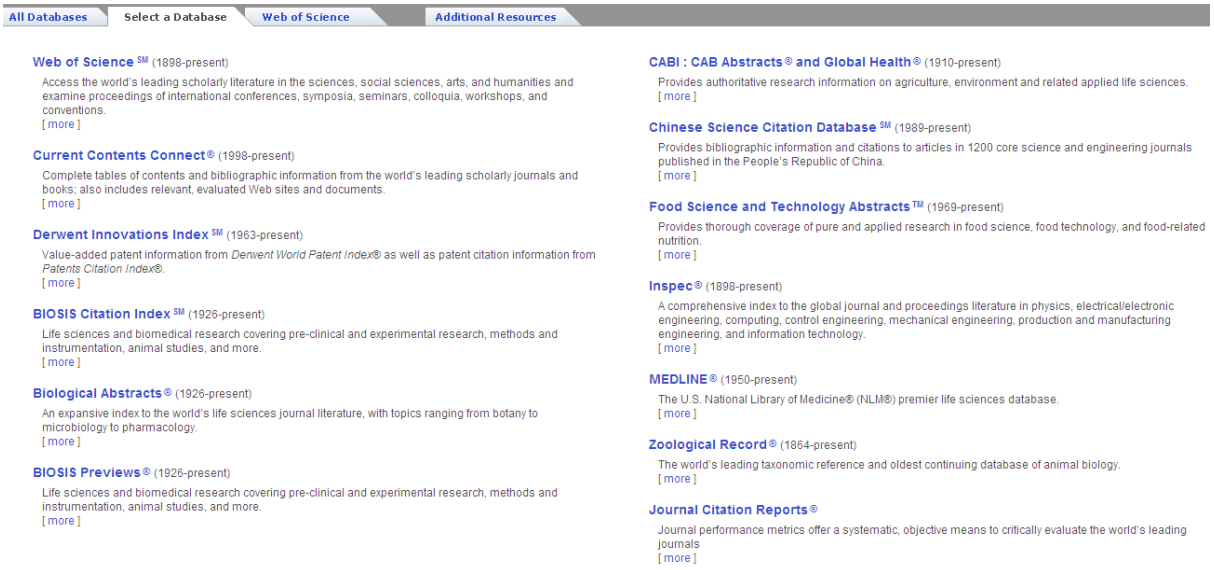
Full text linking is possible via Digital Object Identifiers (DOIs), which are present in 80% of current Inspec journal records. Inspec is a continuation of *Science Abstracts* first published by the Institution of Electrical Engineers in 1898. The Inspec Archive complements the main Inspec Database by extending coverage from 1898-1968. It represents the digitised version of the original *Science Abstracts* series and contains over 873,700 indexed abstracts to journal articles, conference proceedings, books, reports and dissertations. The abstracts often contain diagrams and complex mathematical proofs. The original indexing and classifications are supplemented by current day Inspec Thesaurus terms and Classification codes.

The Inspec Database can satisfy all your research needs. It can be used for:
- current awareness
- new product information
- technological forecasting
- competitive intelligence
- patent-related searching

Inspec on Web of Knowledge Implementation

Database Selection

The arrow shows the link to the Inspec database on the select a database screen of ISI Web of Knowledge. Click on the tab to access the database.



Search Screens

There are two Search Screens available on Web of Knowledge
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Default Search Search

- For casual users and novices
- Ideal for simple searches
- Additional *Search Options* available via a toggle link at the top of the page
- A limited range of search refinement features is available
- *Search History* and *Alerts* are available via links

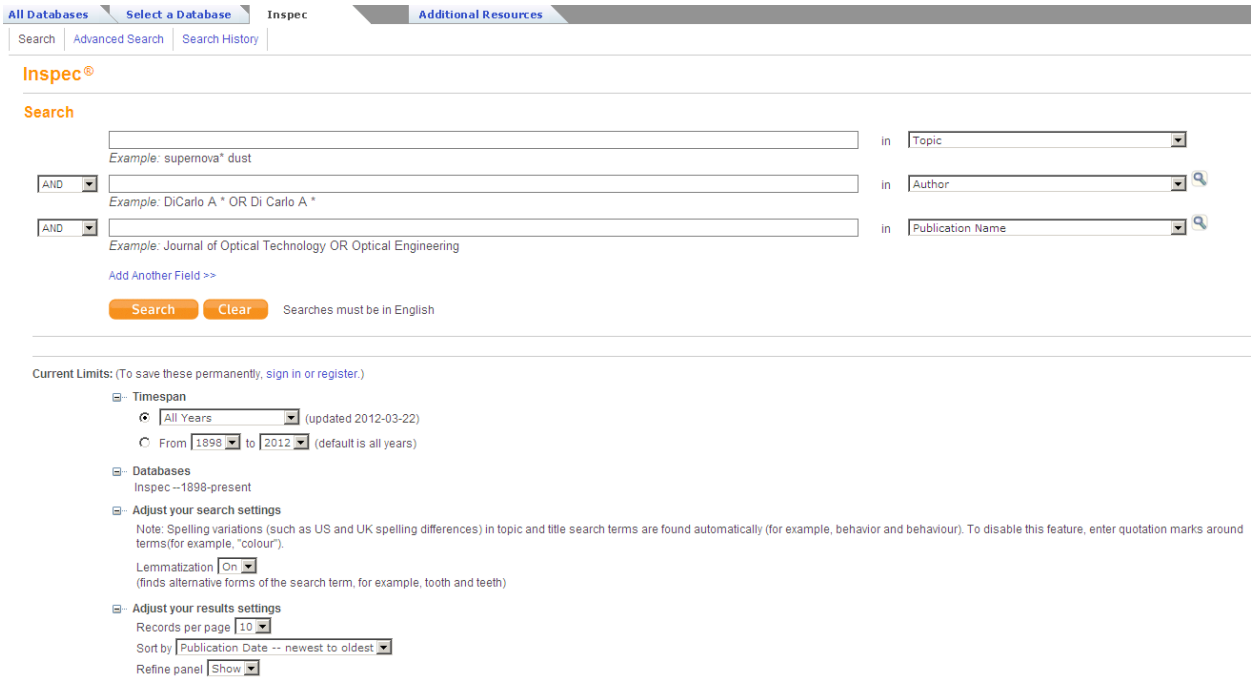
Advanced Search

- For frequent searchers and professional users
- More precise searching is possible
- A wide range of search refinement features is available
- *Search History* and *Alerts* are available via links
- by clicking one of the search links.

The ***Search History*** option is the same for all search types

Default Search Screen

Upon selecting Inspec within the ISI Web of Knowledge you will see the Date / Search & Database Limits Screen and Search (Form Search). Here you can select the time frame you would like to search. Additionally, you have the option to open a previously saved search history. The default search screen is shown below.



The default search screen is the form search. This search facility allows an inexperienced user or a user with little time to spend to do a “quick and easy” search, but the other Advanced (Command Search) search screen is better if you want to do a more specific search, utilising the database to its full capacity.

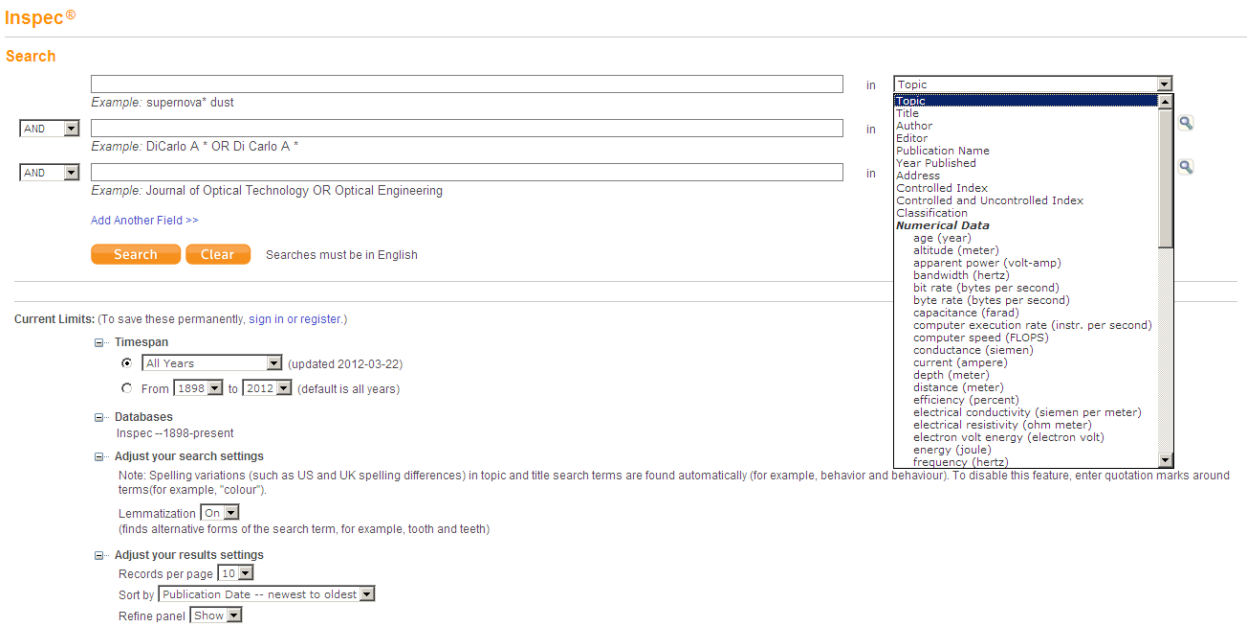
Regardless of what search you are doing, you set the years you want to search within the database using the drop down menus in the Timespan box. The default selection is **All Years**, where "year" refers to the year that the information was entered into the Inspec database and not necessarily when the document was published.

You can also switch the Lemmatisation feature on or off. Lemmatisation can be used to find alternative forms of the search term, for example complex plurals such as mouse and mice or tooth and teeth.

To perform a search:

1. Select the timespan you want to search.
2. Select the type of search: **Search** or **Advanced Search**. Alternatively, click **Search History** to open a previously saved search history file.

The search screen allows you to search any of the given fields via keywords and gives drop down menus and examples to help the user. You can set search limits using the drop down menus at the bottom of the page. It is a good way for you to familiarise yourself with the fields available in the Inspec database.



The search fields appear as a drop down menu as shown above.

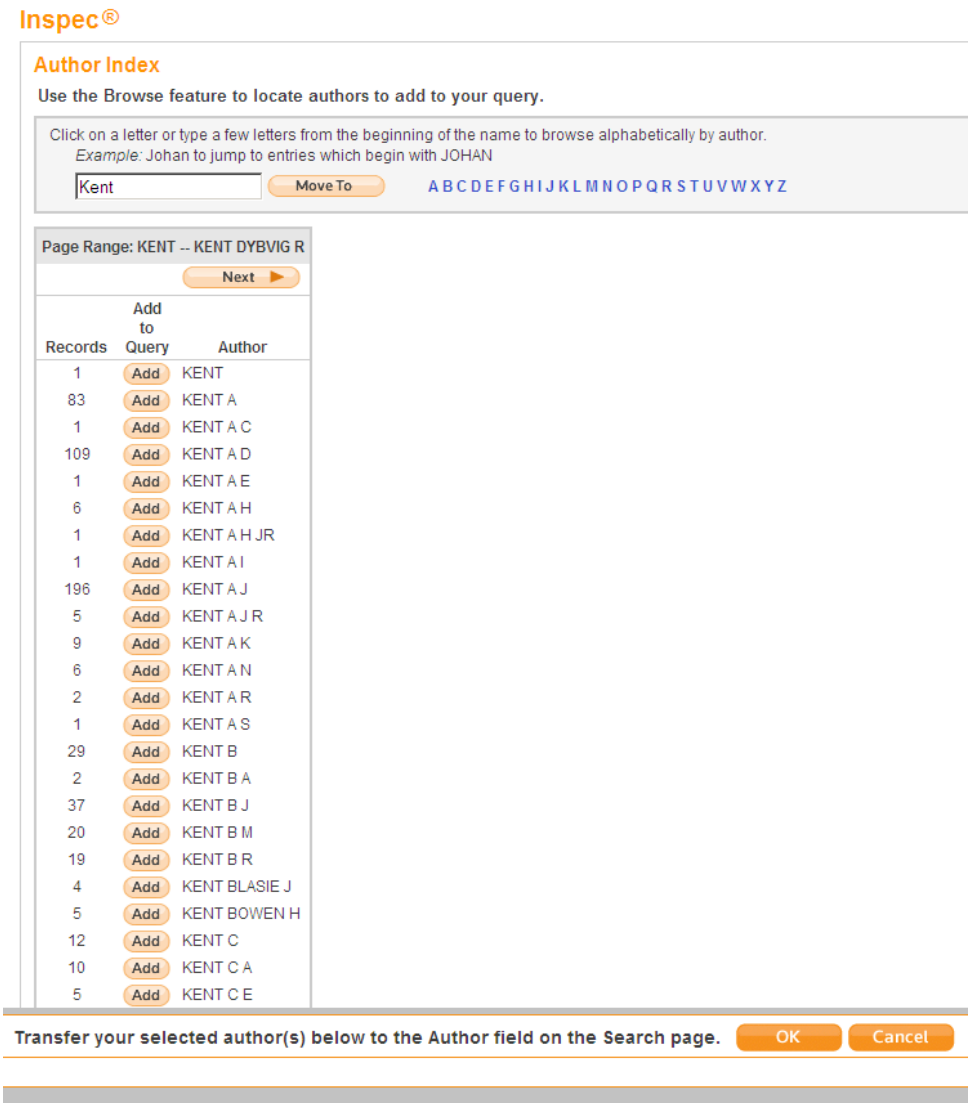
Search fields

Within Inspec you can search for the following criteria:

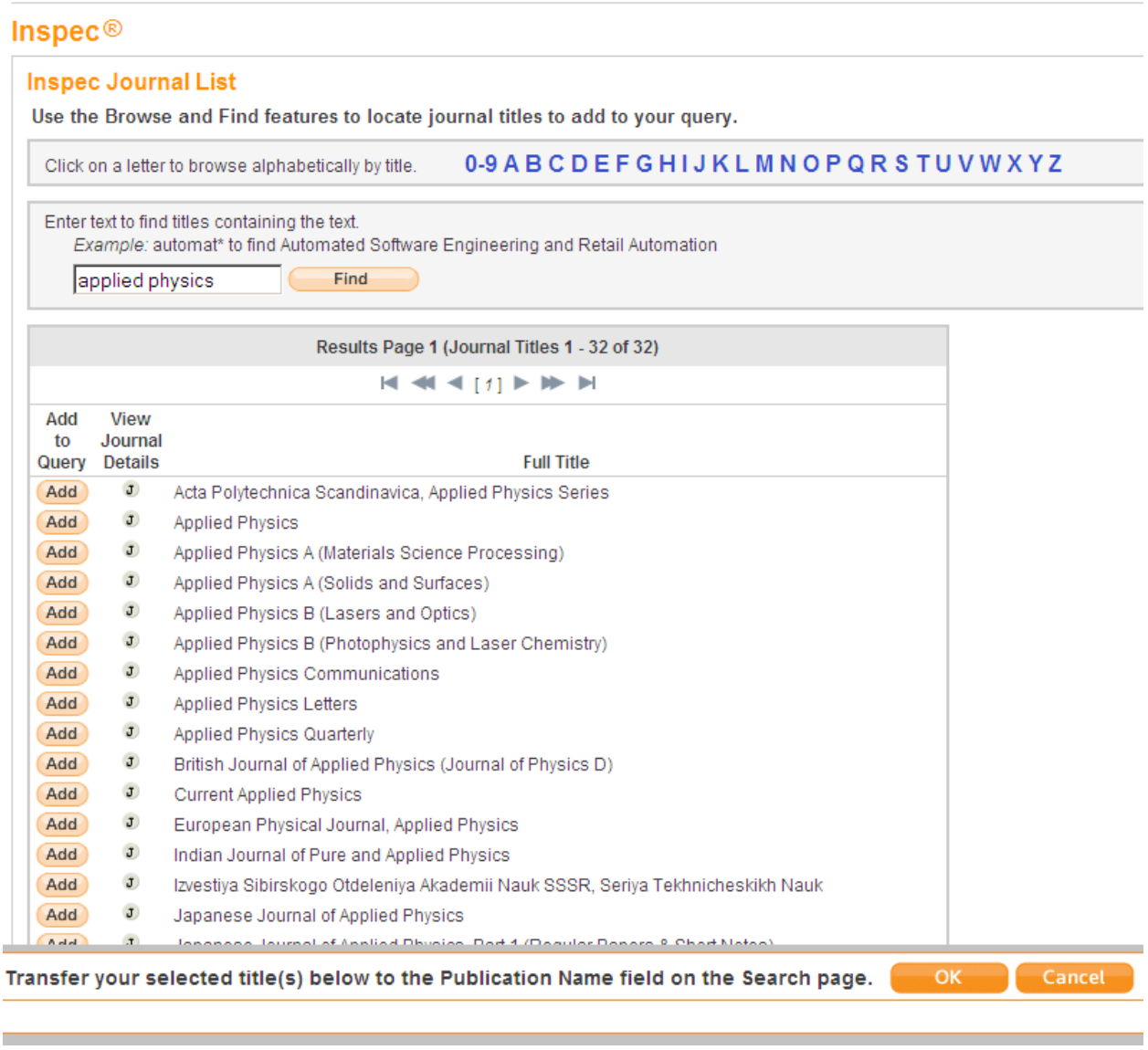
Topic - You can enter one or more terms e.g. satellite AND weather. This searches within titles, classification, controlled index, uncontrolled index or abstracts.

Title - Use this field to search within the article's titles.

Author – You can search for one or more author names e.g. Kent A. By clicking on the  button you can browse the author index.



Publication Name – You can search for a journal title or by clicking on the  button you can browse a list of titles.



Year published - You can limit the years you wish to conduct your search in e.g. 2001 OR 1997-1999.

Address – You can search for an author's affiliation e.g. Geol AND Ukraine.

Controlled Index - The **Inspec Thesaurus**, this contains a listing of the controlled terms and the lead-ins or cross-reference terms used in the Inspec database. It also gives the relationship between terms, the dates on which they were added, and the terms in use before these dates. The Thesaurus contains over 9400 preferred terms.

Controlled Index (including Uncontrolled index terms) – This search field can be used to search for controlled and the uncontrolled index terms. The Uncontrolled Indexing contains single words or phrases from the title, abstract, full text or indexers expertise to describe all significant concepts of the original document. These entries are not standardized either in spelling or terminology.

The Uncontrolled Indexing is particularly useful for searching:

- Topics that are new (which means it is unlikely that Controlled Indexing terms are available yet)
- Organic substances (not covered by the Inspec Chemical Index)
- Inorganic substances before 1987 (prior to the introduction of Chemical Indexing)
- Terms that have both common and technical meanings
- Acronyms and manufacturer's brand names

Classification - The Inspec Classification is the subject guide to the Inspec Database and print publications. Each code represents a specific subject area.

There are 5 sections available:

A Physics
B Electrical & Electronic Engineering
C Computing & Control
D Information Technology for Business
E Manufacturing, Production and Mechanical Engineering

Numerical Data indexing - This is used to overcome problems due to the variety of ways in which an author may express a particular value. For example, to find all the references to power stations generating between 20 and 30 MW, values in this range may be expressed as 29.2 MW, 27500 kW, 25 megawatts, 29 MWatt etc., which makes it impossible to retrieve all records matching the search criteria.

Chemical substance indexing - A controlled indexing system for inorganic substances and material systems and is designed to overcome a number of problems which arise in searching for chemical substances in uncontrolled index terms.

Astronomical Object - Astronomical Object Indexing is a way of controlling the literature by collecting together celestial objects with designations which at least correspond to recognized lists and in acceptable formats. More information can be accessed under:

http://www.theiet.org/publishing/inspec/about/records/astronomical/

Meeting Information - You can search for a conference title, location, sponsor or date e.g. solid film AND Copenhagen AND 1998.

Identifying Codes - You can search for ISSN, ISBN, CODEN, report number, contract number or SICI.

Language - You can limit a search to articles that have been written in a specific language. The default option is "All languages".

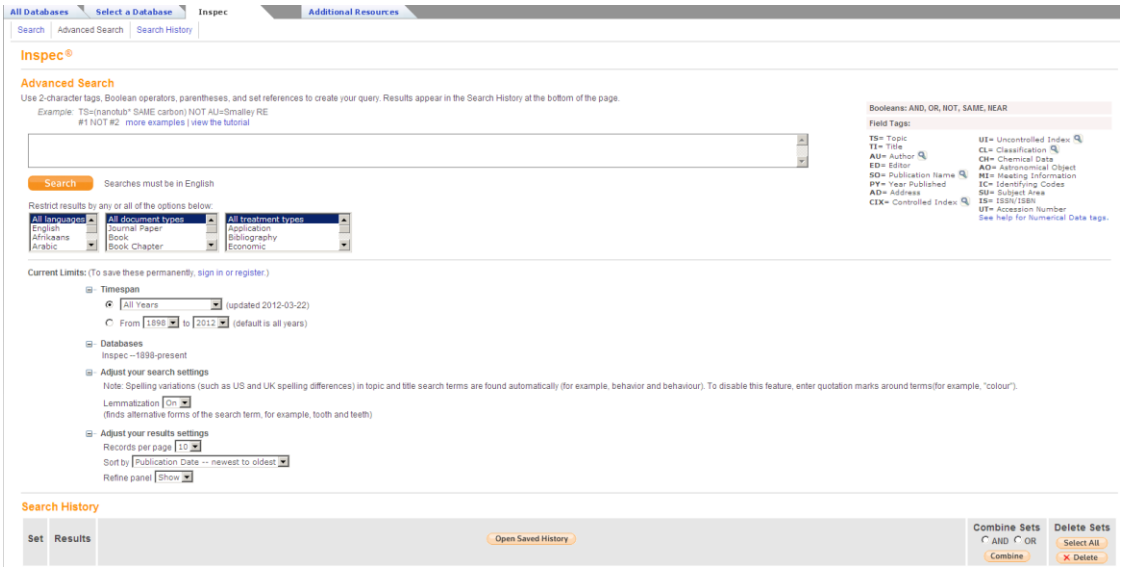
Document Type – You can limit your search to particular document formats by using the drop down menu

Treatment Type - Inspec assigns treatment codes to indicate the approach taken to a subject by the author of a source document.

Treatment codes are especially useful where a search has produced a large number of documents on the required subject. Treatment codes offer a means of selecting those records which are most relevant. A document may have more than one treatment code.

You can limit your search for particular treatment types by using the drop down menu.

Advanced Search Screen



The advanced search screen (shown above) gives the experienced user more flexibility when searching. There is a search box for entering keyword(s) using Boolean and other operators. The advanced search facility is for searchers who know the codes for searching different fields within the database and the ISI operator language. There is some guidance on searching given on the right hand side of the screen, in the form of field tags and Boolean operators. You can construct your own search using Boolean queries. As on the search screen, searches can be limited using the drop down menus.

The search aid buttons  also make the search process easier. You can use these to find every variation on an author name and initials (e.g. Rowan, J. , Rowan J. K. and Rowan, J. Jr.), or browse the full list of journals covered in Inspec. There are also links to a full list of thesaurus terms for the Inspec database and to all the classification codes in Inspec.

Limiters

Additionally you have the option to limit the search by the following Limiters:

- **Languages**
  Select one or more languages from the drop-down menu.
- **Document Types**
  Choose one or more document types from journal article, review, book chapter etc.
- **Treatment Types**
  Select one or more treatment types from: application, bibliography, economic experimental, general or review, new development, practical, product review, theoretical or mathematical.

Field Tags

You can use Advanced Search to create more complex queries using the two-character field tags and set combinations.

TS	Topic/Subject	CI	Controlled Index
TI	Title (article title)	UI	Uncontrolled Index
AU	Author	CL	Classification
SO	Source (journal or other publication title)	CH	Chemical Index
AD	Address / Institution	AO	Astronomical Object
MI	Meeting information	IC	Identifying Codes

For Numerical Index Field Tags, please see separate table in appendix.

Search examples

AD=(Jackson SAME WI)
Finds records containing Jackson and WI in the same address.

AO=PSR 0462 +32 NOT AO=2CG 186 -05
Finds records containing the controlled astronomical object designation AO=PSR 0462 +32, but excludes the designation called AO=2CG 186 -05.

AU=Appleton AND AU=Simms
Finds records of articles written by these two authors.

AU=Lopez T* AND PY=2009
Finds records of articles published in 2009 that were written by T. Lopez.

CH=(B2 SAME Mg)
Finds records containing B2 and Mg in a chemical system with three or more components. Here, the SAME operator specifies that B2 and Mg be components of the same system. If they were combined with AND, then B2 could be a component of one system and Mg a component of a different system in the same record.

CI=photoluminescence AND CI=gallium compounds
Finds records containing both these terms in the Controlled Indexing field of a record.

CL=A4255P AND CL=A7865P
Finds records containing these two classification codes in the Classification Code(s) field of a record.

IC=960 8052 86 6
Finds records containing this ISSN code. The product searches the following field categories.

CODEN
CODEN of translation
Inspec Accession Number
ISSN
ISSN of translation
Standard Book Number
Report Number
Contract Number
Patent Number
Original Patent Number
SICI (Serial Item and Contribution Identifier)
SICI of translation

MI=(phonon AND scattering AND 2004)
Finds records containing these three items in the Conference Information fieldS of a record.

SO=(Thin Solid Films) OR SO=Condensed Matter Physics
Finds records containing articles written in either of these two journals.

SO=(Thin Solid Films OR Condensed Matter Physics) AND TS=nano*
Finds records of articles published in *Thin Solid Films* or *Condensed Matter Physics* in which the term nano* (nanotubes, nanorods, nanotechnology, etc.) appears.

TI= quantum well* AND TI=nano*
Finds records containing the terms quantum (or quantum wells) and nano (or nanotubes, nanotechnology, nanorods, etc.) in the title of an article.

TS="regenerative braking" AND PY=2010
Finds records containing the phrase regenerative braking in records of documents published in 2010.

TS=(quantum dot* AND superlattice*) NOT TS=mechanics
Finds records containing the term quantum dot (or quantum dots) and superlattice (or superlattices.), but excluding records that contain the term mechanics.

TS=(infrared AND ultraviolet) AND #1 NOT #2
Finds all records containing the search terms infrared and ultraviolet as well as all records in set #1 but exclude records in set #2.

UI=mobile robot*
Finds records containing the phrase mobile robot, mobile robotic, etc. in the Uncontrolled Indexing field.

Searching Inspec Subject Fields

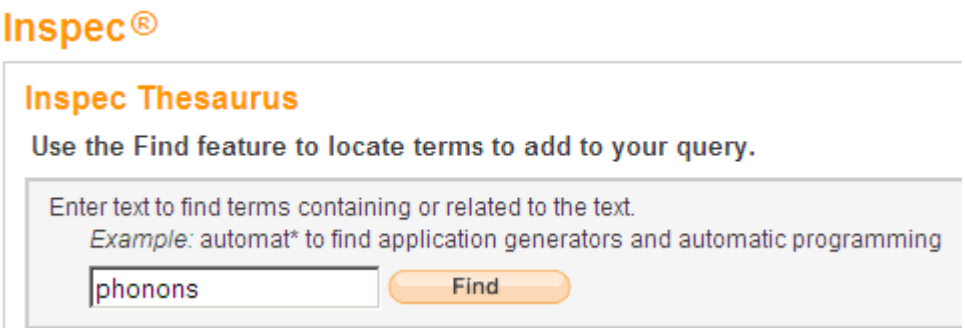
Inspec Thesaurus

The Thesaurus is a very good way to narrow down your search to a specific topic, or to find other related terms to broaden your search. **Inspec Thesaurus**

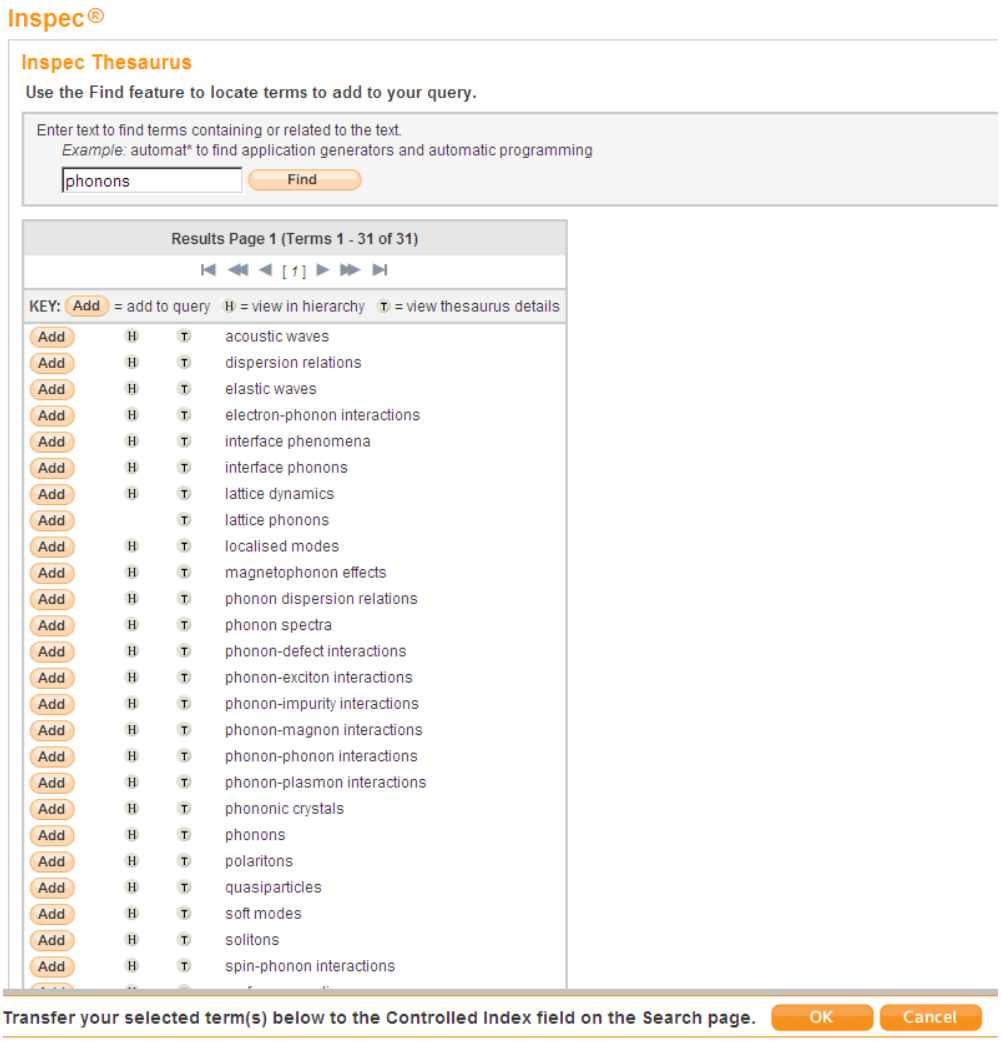
terms have been selected by subject specialists, so you can be sure that when searching via the Thesaurus you will receive non-relevant items than when you do a simple keyword search

This search field can be used to find these terms in a record, by clicking on the  button you can browse the thesaurus for the term you require.

Click on the **Inspec Thesaurus** link, to enter a search term in the “Find “box.

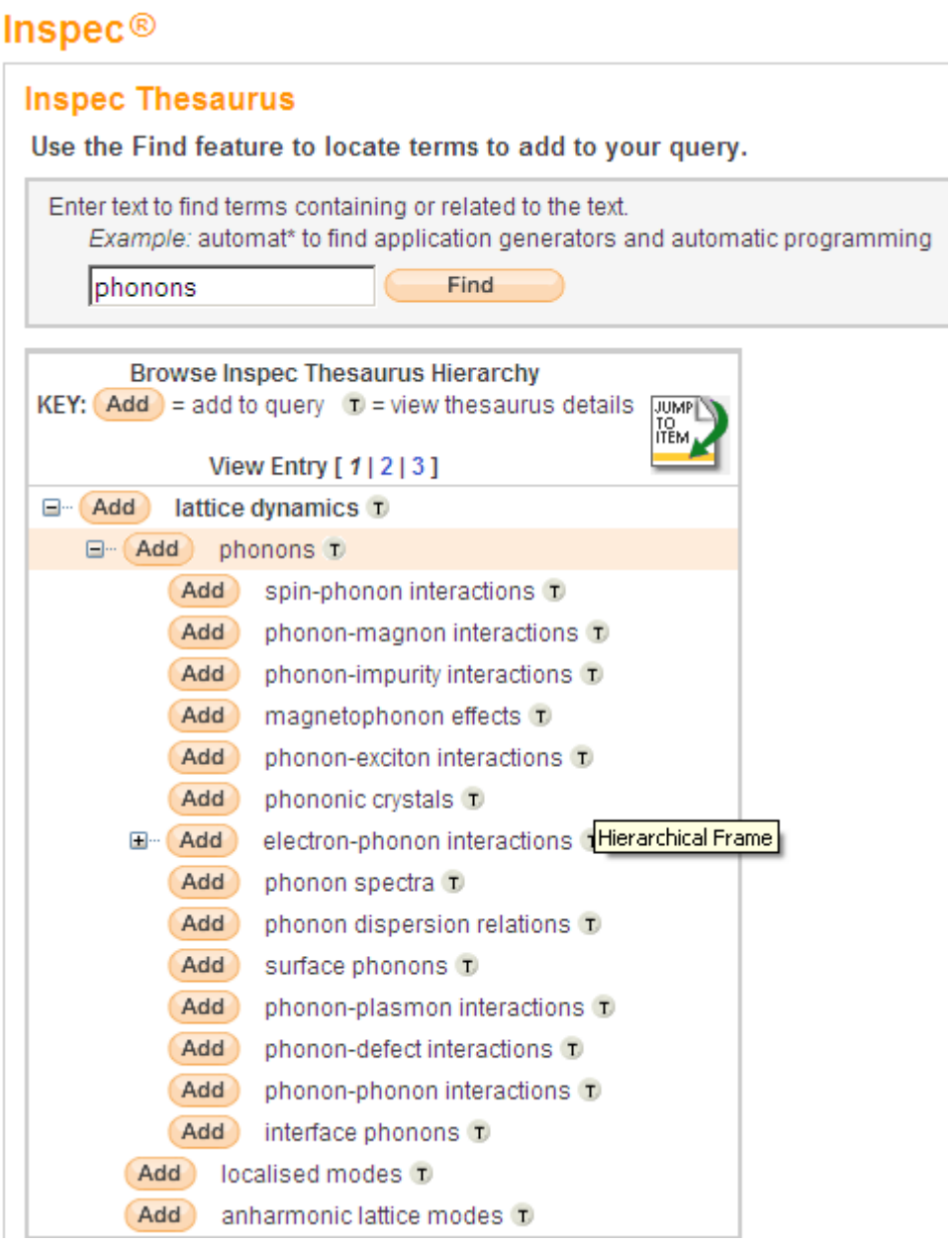


The screen overleaf shows the Thesaurus term the user searched for in an alphabetical context.



Click on the “H” tab to see the hierarchy.

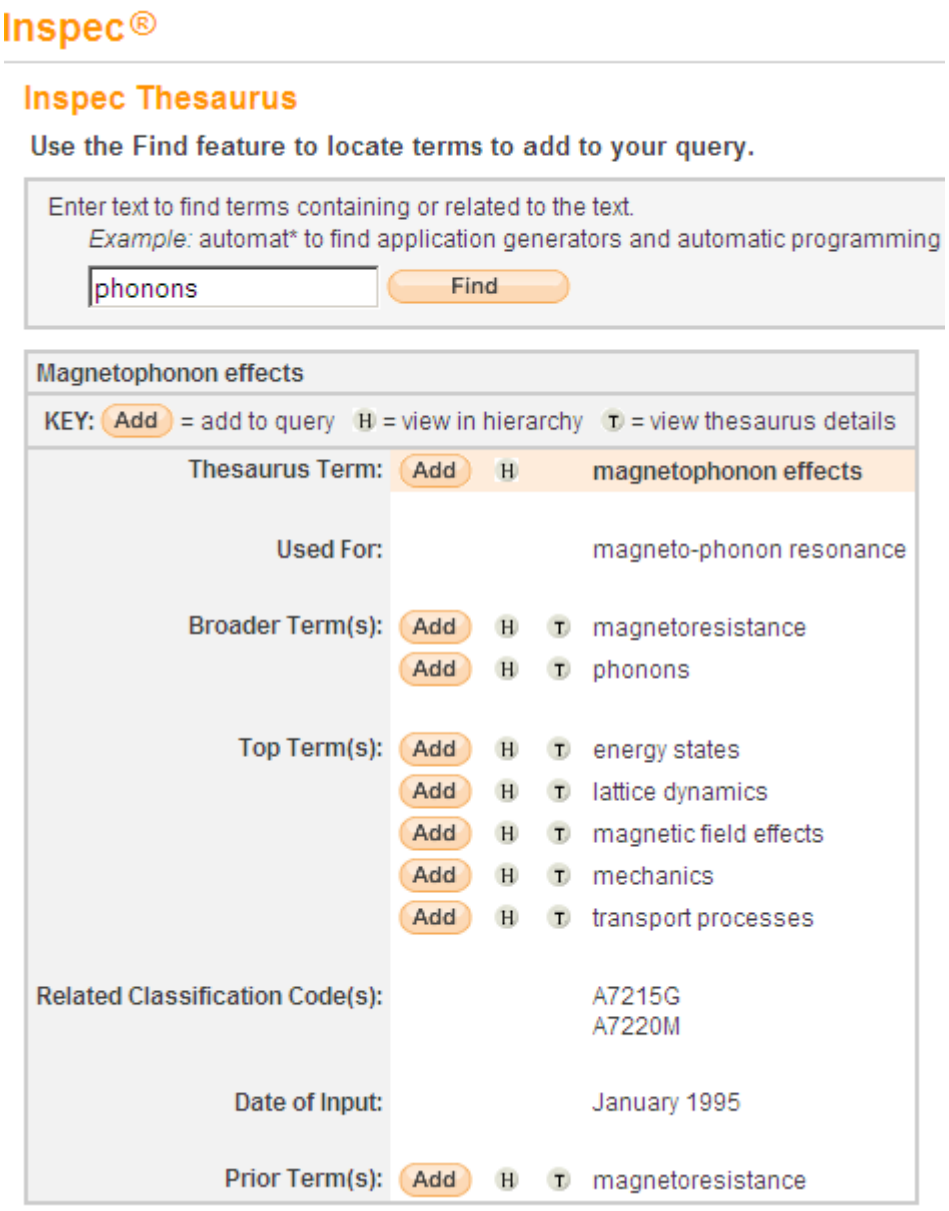
A typical example of an **Inspec Thesaurus** hierarchy.



To add thesaurus terms to your search, click on the “ADD” tab next to the term.

You can click on the “T” tab to see the thesaurus details (see overleaf) for a given term, i.e. the year it was included in the **Inspec Thesaurus** and the

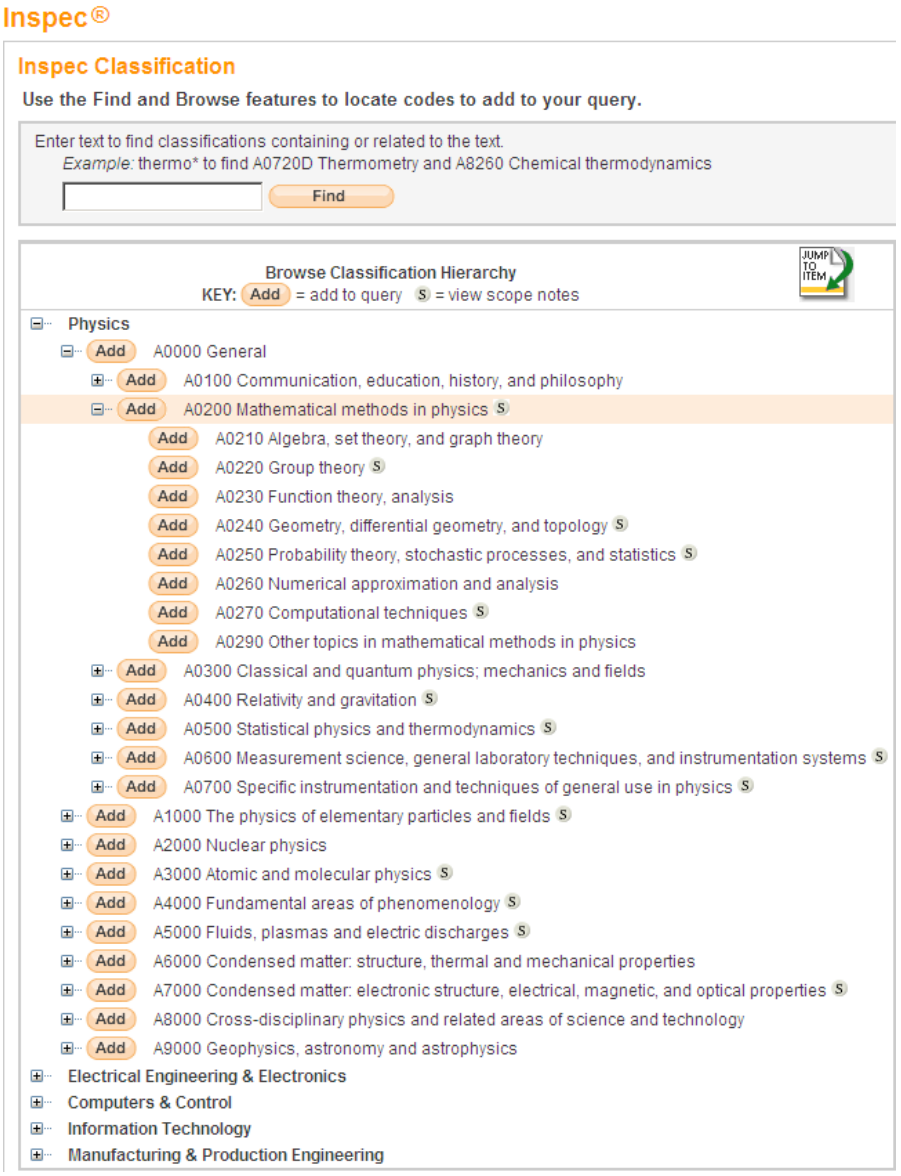
broader, narrow and related terms. It also allows you to see prior terms and related classification codes.



Inspec Classification

When searching the Inspec Database the codes are useful in refining a search to a particular subject e.g. mechanical engineering applications, which improves the retrieval accuracy. Each record has at least one, in many cases multiple classification codes, often from more than one section of the database.

You can browse Inspec Classifications in much the same way as the Inspec Thesaurus. By clicking the button you can browse the classification code hierarchy, as shown overleaf:



Click on the “ADD” button to transfer the classification code into the relevant search field. To expand on a specific classification code, click on the ⊞ button. classification codes are assigned at the most specific level possible.

Search Tips

Inspec Classification can be used from a broad (two characters) to the most specific level (six characters).

- Using broad Classification Codes (such as B31* or B3*) can be very useful in particular for occasional users. Using these codes it is possible to navigate to the appropriate part of the database and increase the relevance of the search results.
- Using very specific Classification Codes (such as B3110C for ferromagnetic materials) will provide you with very precise search results.

Inspec Classification (outline)

A – Physics

A0 General
A1 The physics of elementary particles and fields
A2 Nuclear physics
A3 Atomic and molecular physics
A4 Fundamental areas of phenomenology
A5 Fluids, plasmas and electric discharges
A6 Condensed matter: structure, thermal and mechanical properties
A7 Condensed matter: electronic structure, electrical, magnetic, optical properties.
A8 Cross-disciplinary physics and related areas of science and technology
A9 Geophysics, astronomy and astrophysics

B - Electrical Engineering and Electronics

B0 General topics, engineering mathematics and materials science
B1 Circuit theory and circuits
B2 Components, electron devices and materials
B3 Magnetic and superconducting materials and devices
B4 Optical materials and applications, electro-optics and optoelectronics
B5 Electromagnetic fields
B6 Communications
B7 Instrumentation and special applications
B8 Power systems and applications

C - Computers and Control

C0 General and management topics
C1 Systems and control theory
C3 Control technology
C4 Numerical analysis and theoretical computer topics
C5 Computer hardware
C6 Computer software
C7 Computer applications

D - Information Technology for Business

D1 General and management aspects
D2 Applications
D3 General systems and equipment
D4 Office automation - communications
D5 Office automation – computing

E – Manufacturing, Production and Mechanical Engineering

E0 General topics in Manufacturing & Production Engineering
E1 Manufacturing and production
E2 Engineering Mechanics
E3 Industrial sectors

Numerical Indexing

Numerical Data Indexing is applied to Inspec records when numerical data appear in the original title or abstract, or are encountered in the normal processing of the original document, and where they appear important for computer-assisted retrieval.

Data are likely to be important for computer-assisted retrieval if they fall into any of the following categories:

a) Relevant and essential operating characteristics of actual or potential devices, instruments, equipment, machines or systems for which subject headings are assigned. Characteristics of particular importance include frequency, wavelength, power and energy.

b) Relevant and important criteria of effects, phenomena and processes for which subject headings are assigned. This is likely to be the experimental or operating conditions, measured values or observations. Temperature, pressure and frequency or wavelength are criteria of particular importance.

Only actual numbers are indexed. No attempt is made to index implied ranges such as “millimetre waves”, “UV region”, “VHF”, etc.

Inspec Numerical Data Indexing can be searched within records from 1987 onwards. Numerical information in the format used within the original document can also be found within the Inspec uncontrolled terms.

Each Numerical Data Indexing term has the following format:

Quantity **Value (to Value)** **Unit** where:

quantity represents the physical quantity, for example temperature,
unit is of the SI type, for example metre (m), **value** is the actual value or range expressed in floating point format.

Inspec’s numerical data indexing standardizes the format, for example, the power of 25 megawatts would be given as 2.5E+07W and a range of 30 Hz to 18 kHz would be given as 3.0E+01 to 1.8+04 Hz.

Values are given in floating point format, e.g. 1.8E+04 for 18000 and 9.5E-01 for 0.95.

Numerical Data Indexing Thesaurus

The Numerical Data Indexing Thesaurus is used as an authority file to control the quantities and units appearing in the Inspec database.

There are two types of entry within the Numerical Data Thesaurus:

Preferred Quantity/Unit

These are of the form:

Quantity : Unit (Name)
Scope Note
Unit Information

Where 'Quantity : Unit' is the preferred quantity and unit combination,
'Name' is the full name where 'unit' is an abbreviation,
'Scope Note' is any additional information on the use of this quantity,
'Unit Information' is information about units other than the preferred unit and how to convert data in these units to the preferred unit.

e.g. temperature : K (kelvin)
Used for absolute temperatures and not temperature differences
C *use* K [K = C + 273.15]
degC *use* K [K = degC + 273.15]
F *use* K [K = (F + 459.67) x 0.5555556]
degF *use* K [K = (degF + 459.67) x 0.5555556]
degK *use* K

All quantities were introduced at the start of 1987 unless a later start date is given, e.g. see Byte rate… 1989-.

Unit information can be of two types:

- Unit Synonym Information: These point to preferred units from numerically identical units for preferred quantities. They are of the form:

  Unit *use* Unit P

  where Unit P is the preferred unit, e.g. degK *use* K.

- Unit Conversion Information: These point to preferred units from other units for given quantities. The numerical relationship between the two units is given. These are of the form:

Unit L us Unit P [Unit P = F(Unit L)]

Where Unit L is the listed unit and Unit P is the preferred unit and [F(Unit L)] is the equation for converting Unit L into Unit P, e.g. degC use K [K = degC + 273.15]

Lead-in Entries

These entries point to preferred quantities from either units or non-preferred quantities. They are of the form either:

Quantity *use* Quantity P, e.g. electric potential use voltage, or,

Unit *see* Quantity P, e.g. hour *see* time

Numerical Data Field Tags

AG = Age (yr; Year)	MA = Mass (kg; Kilogram)
AL = Altitude (m; Meter)	MD = Magnetic Flux Density (T; Tesla)
AP = Apparent Power (VA; Volt-amp)	MS = Memory Size (Byte)
BI = Bit Rate (Bit/s; Bits per Second)	NF = Noise Figure (dB; Decibel)
BW = Bandwidth (Hz; Hertz)	PO = Power (W; Watt)
BY = Byte Rate (Byte/s; Bytes per Second)	PR= Pressure (Pa; Pascal)
CA = Capacitance (F; Farad)	PS = Printer Speed (cps; Characters / Second)
CD = Conductance (S; Siemens)	PX = Picture Size (pixel; Picture Element)
CE = Computer Execution Rate (IPS; Instructions per Second)	RA = Radiation Absorbed Dose (Gy; Gray)
CM = Computer Speed (FLOPS; Floating-Point Operations Per Second)	RD = Radiation Dose Equivalent (Sv; Sievert)
CU = Current (A; Ampere)	RE = Resistance (Ohm)
DI = Distance (m; Meter)	RP = Reactive Power (VAr; Volt-Amp Reactive)
DP = Depth (m; Meter)	RX = Radiation Exposure (C/kg; Coulomb per Kilogram)
EF = Efficiency (Percent)	RY = Radioactivity (Bq; Becquerel)
EL = Electrical Conductivity (S/m; Siemens per Meter)	SI = Size (m; Meter)
EN = Energy (J; Joule)	SM = Stellar Mass (Msol; Solar Mass)
ER = Electrical Resistivity (ohmm; Ohm meter)	SR = Storage Capacity (Bit)
EV = Electron Volt Energy (eV; Electron Volt)	TE = Temperature (K; Kelvin)
FR = Frequency (Hz; Hertz)	TM = Time (s; Second)
GA = Gain (dB; Decibel)	VE = Velocity (m/s; Meters per Second)
GD = Galactic Distance (pc; Parsec)	VO = Voltage (V; Volt)
GE = Geocentric Distance (m; Meter)	WA = Wavelength (m; Meter)
HD = Heliocentric Distance (AU; Astronomical Unit)	WL = Word Length (Bit)
LS = Loss (dB; Decibel)	

Chemical Substance Indexing

Inspec's Chemicals Indexing field (CI) is a controlled indexing system for inorganic substances and material systems, and is designed to overcome a number of problems which arise in searching for chemical substances in uncontrolled index terms.

Typical search problems

- Non-stoichiometric compounds or alloys which may be represented in several ways, e.g., GaAlAs or GaxAl1-xAs
- Chemical formulae that have the same spellings as common English words, e.g., GaP
- Some chemicals have the same letters and are differentiated by the use of upper and lower case, e.g., Co (cobalt) or CO (carbon monoxide).

Role indicators

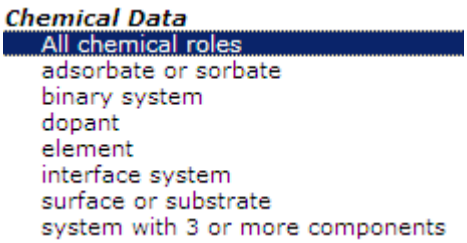
Each chemical index term has a role indicator assigned to it to distinguish between the different references.

These are:

- el for element - e.g., Si
- bin for binary (two components) - e.g., GaAs
- ss for system (three or more components) - e.g., H_2SO_4

Some substances may be assigned one or more special roles which are of significance to solid-state physics and electronics. These are:

- int – interface system
- sur – surface or substrate
- ads – adsorbate
- dop – dopant



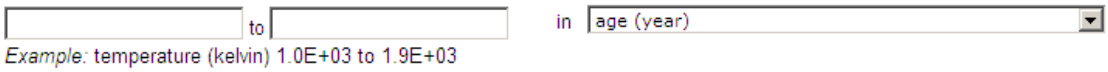
Each component of a substance is assigned one of these roles - e.g., the element silicon (Si) is indexed as Si/el and silicon dioxide is indexed as Si02/bin Si/bin 0/bin.

Examples of chemical indexing

H_2SO_4	H2SO4/ss SO4/ss H2/ss O4/ss H/ss S/ss O/ss
P doped Si	Si:P/bin Si/bin P/bin Si/el P/el P/dop
Cu-Al alloy	CuAl/bin Cu/bin Al/bin
Si-Au interface	Si-Au/int Si/int Au/int Si/el Au/el
GaAlAs	GaAlAs/ss Ga/ss Al/ss As/ss
$Ga_xAl_{1-x}As$	GaAlAs/ss Ga/ss Al/ss As/ss
$Ga_{0.25}Al_{0.75}As$	Ga0.25Al0.75As/ss Ga0.25/ss Al0.75/ss Ga/ss Al/ss As/ss

Search tips:

- When searching for a substance that has a straightforward formula (e.g. H_2SO_4) it is best to search directly for the substance with the appropriate role.
- However, when searching substances in which the order of elements can be variable or the order is not precisely known (semiconductors, alloys, mixtures) it is necessary to consider all possible variations of the formula searched. It is therefore better to search for individual components



Astronomical Object Indexing

Astronomical Object Indexing designations have been indexed in a separate field since 1995. This allows for named or numbered objects to be retrieved more efficiently. The designations are of the following types:

- Name based acronyms

LMC is an acronym for the Large Magellanic Cloud. Objects in constellations such as R Sct. appear with the IAU-approved three-letter abbreviation for the constellation.

- Catalogue based acronyms

A designation containing an acronym for the catalogue followed by the catalogue entry number. This number may be sequential, such as NGC 204 or it may represent an approximate location in the sky, usually in terms of right ascension and declination (such as PSR 1913+16) or Galactic coordinates (e.g. G 345.01+1.79)

- Positional information only

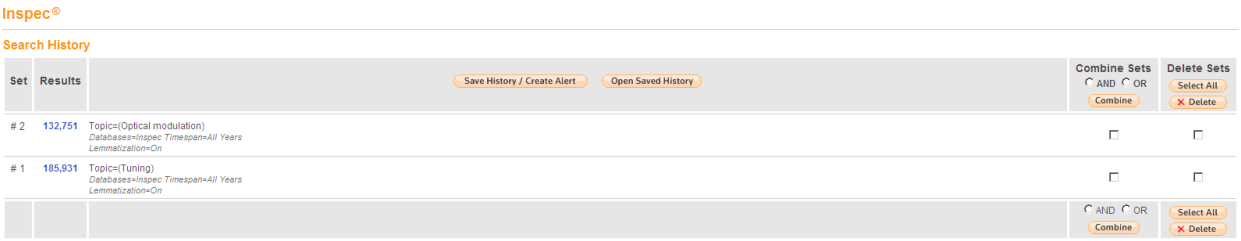
For example: 013022+30233

Searching Astronomical Object Data - Examples

Search Examples	Search Syntax	Search Results April 2004	Search Hints
Markarian Galaxies	AO=Mrk*	798	before 1995: TS=(mrk* or mkn*) or TS=(markarian or markaryan)
X-ray source which starts at 3A 0322	AO=3a 0322	5	search the string as indicated
Objects with positional designations	AO=1608*	76	retrieves objects in both hemispheres
	AO=1608 -52*	53	retrieves object in a small patch of the sky (southern hemisphere)

Note: Inspec follows the guidelines produced by the International Astronomical Union. A thesaurus-type document entitled “Nomenclature of Astronomical Catalogue Designations is available upon request from Inspec.

Search History



In the **Search History** screen you can view, combine and delete previous searches and create alerts. The create alerts option will allow you to set up alerts on your chosen search topics and determine the frequency, format and style you would like to receive them. You can also save the search history on your personal space. The search history shows your previous searches together with the number of results obtained for that search.

Search History is an important search and navigation tool. It allows you to review your current search strategy and to build gradually complex searches by reviewing the results and adding new concepts.

Combine Searches

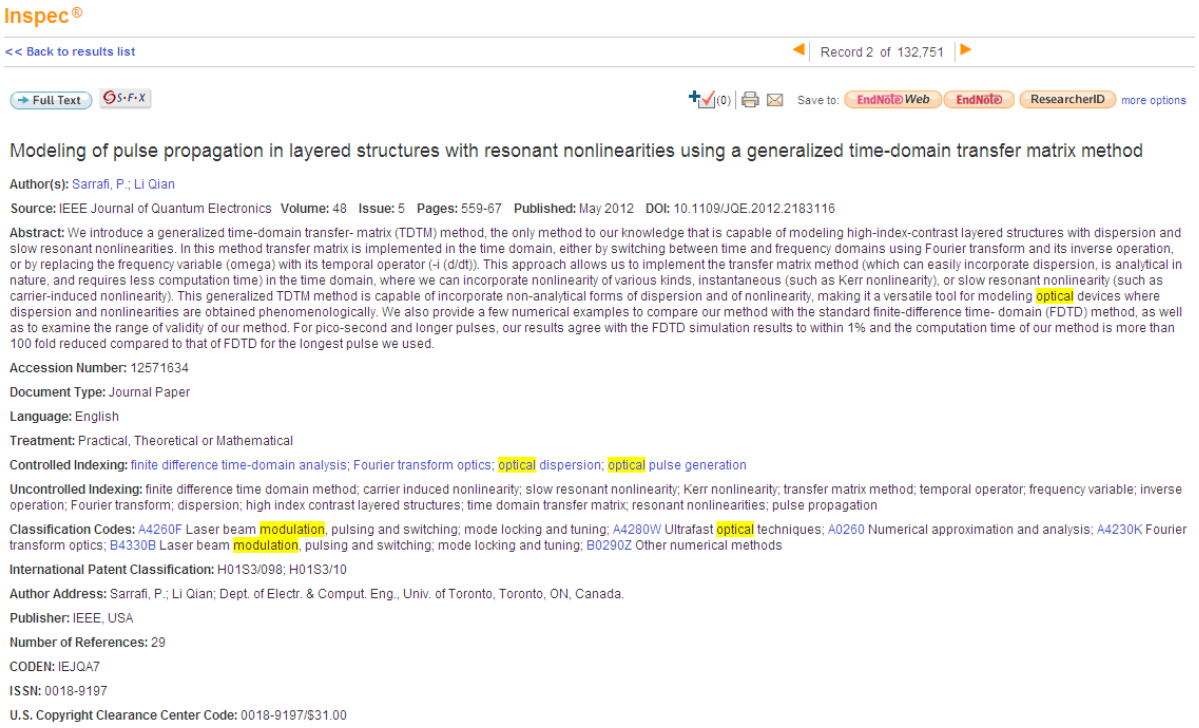
You can Combine Sets of results on the advanced search screen or on the search history screen. You do this by ticking the relevant sets of results in the search history, then choosing the Boolean operator you wish to use to combine these sets. You can then click on “Combine” to perform the search.

You can also manually combine sets of results in the search box by entering the set numbers of the results you would like to combine preceded by hash (#) and using the Boolean operators (AND, OR, NOT) and then clicking on “Search”. For example:

(#1 AND #2) NOT #3
#1 AND #2 NOT #3 which is the equivalent of typing #1 AND (#2 NOT #3)

Inspec Record Example

A typical full Inspec record can be seen below. Links to full text and different bibliographic management software options are present. All author names, controlled index terms, classification codes and chemical index terms are hyperlinked.



Inspec®

<< Back to results list Record 2 of 132,751

Full Text S·F·X (0) Save to: EndNote Web EndNote ResearcherID more options

Modeling of pulse propagation in layered structures with resonant nonlinearities using a generalized time-domain transfer matrix method

Author(s): Sarrafi, P.; Li Qian

Source: IEEE Journal of Quantum Electronics **Volume:** 48 **Issue:** 5 **Pages:** 559-67 **Published:** May 2012 **DOI:** 10.1109/JQE.2012.2183116

Abstract: We introduce a generalized time-domain transfer- matrix (TDTM) method, the only method to our knowledge that is capable of modeling high-index-contrast layered structures with dispersion and slow resonant nonlinearities. In this method transfer matrix is implemented in the time domain, either by switching between time and frequency domains using Fourier transform and its inverse operation, or by replacing the frequency variable (omega) with its temporal operator (-i (d/dt)). This approach allows us to implement the transfer matrix method (which can easily incorporate dispersion, is analytical in nature, and requires less computation time) in the time domain, where we can incorporate nonlinearity of various kinds, instantaneous (such as Kerr nonlinearity), or slow resonant nonlinearity (such as carrier-induced nonlinearity). This generalized TDTM method is capable of incorporate non-analytical forms of dispersion and of nonlinearity, making it a versatile tool for modeling optical devices where dispersion and nonlinearities are obtained phenomenologically. We also provide a few numerical examples to compare our method with the standard finite-difference time- domain (FDTD) method, as well as to examine the range of validity of our method. For pico-second and longer pulses, our results agree with the FDTD simulation results to within 1% and the computation time of our method is more than 100 fold reduced compared to that of FDTD for the longest pulse we used.

Accession Number: 12571634

Document Type: Journal Paper

Language: English

Treatment: Practical, Theoretical or Mathematical

Controlled Indexing: finite difference time-domain analysis; Fourier transform optics; optical dispersion; optical pulse generation

Uncontrolled Indexing: finite difference time domain method; carrier induced nonlinearity; slow resonant nonlinearity; Kerr nonlinearity; transfer matrix method; temporal operator; frequency variable; inverse operation; Fourier transform; dispersion; high index contrast layered structures; time domain transfer matrix; resonant nonlinearities; pulse propagation

Classification Codes: A4260F Laser beam modulation, pulsing and switching; mode locking and tuning; A4280W Ultrafast optical techniques; A0260 Numerical approximation and analysis; A4230K Fourier transform optics; B4330B Laser beam modulation, pulsing and switching; mode locking and tuning; B0290Z Other numerical methods

International Patent Classification: H01S3/098; H01S3/10

Author Address: Sarrafi, P.; Li Qian; Dept. of Electr. & Comput. Eng., Univ. of Toronto, Toronto, ON, Canada.

Publisher: IEEE, USA

Number of References: 29

CODEN: IEJQA7

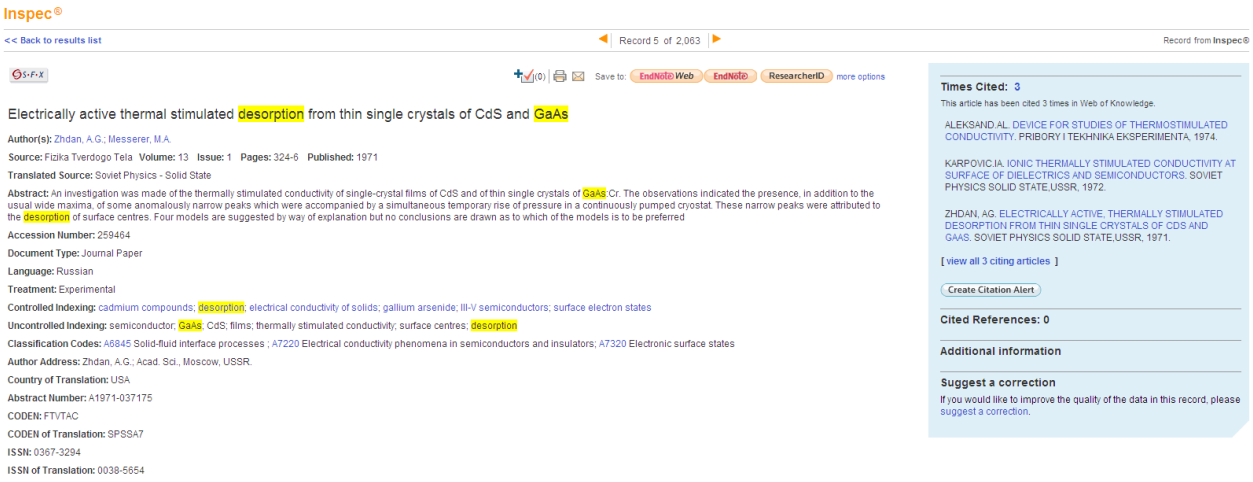
ISSN: 0018-9197

U.S. Copyright Clearance Center Code: 0018-9197/$31.00

Web of Knowledge Extras

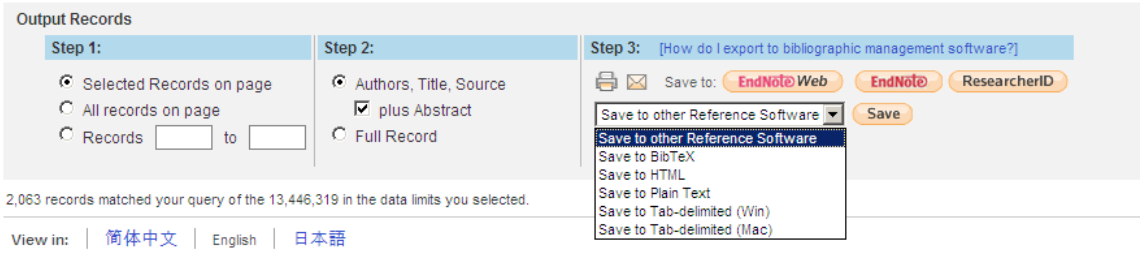
Citation Data

You can access the citation data of any given record through Web of Science as shown in the screen shot below. You can also create citation alerts, this functionality will send you an email every time the article is cited. You can also view related records and references via the Web of Science.



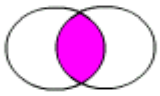
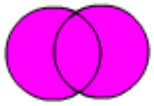
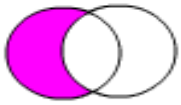
Exporting to Bibliographic Management Software

Any record or records you find may be exported to bibliographic management software or emailed. Web of Knowledge allows you to save directly to Endnote Web, Endnote, Refman and ProCite. BibTex, HTML, Plain Text, Tab-delimited (Win) and Tab-delimited (Mac) formats are also available via the drop down menu. You can choose to save the Author, Title and Source information with or without the Abstract, or you can save the Full Record.



Search Tools

Boolean Operators

AND  pulsar* AND magnetosphere*	All search terms must occur to be retrieved. **TOPIC: pulsar* AND magnetosphere*** retrieves documents that contain both pulsar* and magnetosphere*.
OR  backscatter* electron* OR bse	Any one of the search terms must occur to be retrieved. Use when searching variants and synonyms. **TOPIC: backscatter* electron* OR bse** retrieves documents that contain at least one of **backscatter* electron*** or **bse**
NOT  rover* NOT planetary	Excludes records that contain a given search term. **TOPIC: rover* NOT planetary** Retrieves documents with rover*, excluding any which also contain planetary.

Proximity Operators

Implied Adjacency	By default, searching a phrase retrieves records that contain the adjacent terms in the same order. **Topic: mobile comput***
	Title: Evolving cellular automata for location management in **mobile computing** networks
Same	Terms must occur within the same sentence (where “sentence” is understood to be a period-delimited string), in any order. Topic: wind* same (power or energ*)
	Title: Techno-economic analysis of autonomous PV-**wind** hybrid **energy** systems using different sizing methods. **Abstract:** The sizing and techno-economic optimisation of an autonomous PV-**wind** hybrid **energy** system with battery storage is addressed in this article

Truncation

Truncation can be used in a number of different ways. You can truncate the end of a word in order to retrieve all mentions of the word (singular and plural). In cases of irregular plurals, or to retrieve all forms of a root word, use the * to retrieve more than one character. You can use internal truncation or wildcard characters to retrieve alternate or British spellings of words. Truncate after at least three characters.

? = one character only
* = zero or more characters
$ = zero or one character

Right Side Truncation		**Internal Truncation (Wildcards)**	
Volt*	**Volt** **Volts** **Voltage**	**Man$euv***	**Manoeuvre** **Maneuver** **Maneuvering**
Mass*	**Mass** **Massif** **Massless** **Massive**	**Sul*uri?ation**	**Sulfurization** **Sulfurisation** **Sulphurization** **Sulphurisation**
Compute$	**Compute** **Computer** **Computed**	**Colo$r**	**Color** **Colour**

Order of Precedence

( )
SAME
NOT
AND
OR

You can use parentheses to override the order of precedence when using multiple Boolean and/or Proximity operators. Up to fifty search operators can be used in a single search statement.

Examples:

TOPIC: protocol$ and (P2P* or peer-to-peer*)
Retrieves documents that contain some variant of the word *protocol* and either one (or both) of the terms in parenthesis.

TOPIC: building$ same (energy effic* or self-sufficien* or intelligent or green)
Retrieves documents that contain some variant of the word *building* in the same "sentence" as any of the terms in parenthesis.

Web of Knowledge Search Fields

Field Names	Field Tag	Examples
Address / Institution	AD	AD=(philips SAME netherlands)
Astronomical Object	AO	AO=rz cas
Author	AU	AU=christensen, c?
Chemical Index	CH	CH=GaN/int
Controlled Index	CI	CI=photoluminescence
Classification	CL	CL=A4255P
Identifying Codes (Inspec AccesionNumber, CODEN, ISBN, ISSN, Report Number, Contract Number, Patent Number, SICI)	IC	IC=960 8052 86 6
Meeting information (Title of conference, location, sponsors, dates)	MI	MI=solid film* AND Copenhagen AND 1998
Numerical Data Indexing	see Page33 for numerical data tags	FR=3.0+09
Year published	PY	PY=2010
Source (journal or other publication title)	SO	SO="Condensed Matter Physics"
Title (article title)	TI	TI="quantum well"
Topic/Subject	TS	TS=(regenerative braking)
Uncontrolled Index	UI	UI=biochip

Limit Fields
Document Type
Language
Treatment Code