How to conduct a literature search

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Service d'appui à la recherche et à l'information scientifique

Agenda

1. Literature search methodology
2. How to use WoS and Scopus for a literature search ?
3. Zotero

Literature search methodology

A literature search is a systematic and well-organized search for the already published data to identify a breadth of good quality references on a specific topic.

01

Understand, express and formulate the question

02

Build a search strategy

03

Identify the relevant types of document and related information sources

and adapt the search strategy accordingly

Define the research question and the concepts

→ **Define the research question:**

Write down your research question as a short sentence

→ **Define the subject semantics :**

- Identify the concepts / terms
- For each concept, make a list of the **synonyms**, the **specific terms**, the **generic terms**, the **abbreviations and acronyms,** the **alternative spelling, translations**

→ **Define the timespan**

→ **Identify the document types (scientific publications, patents,…)**

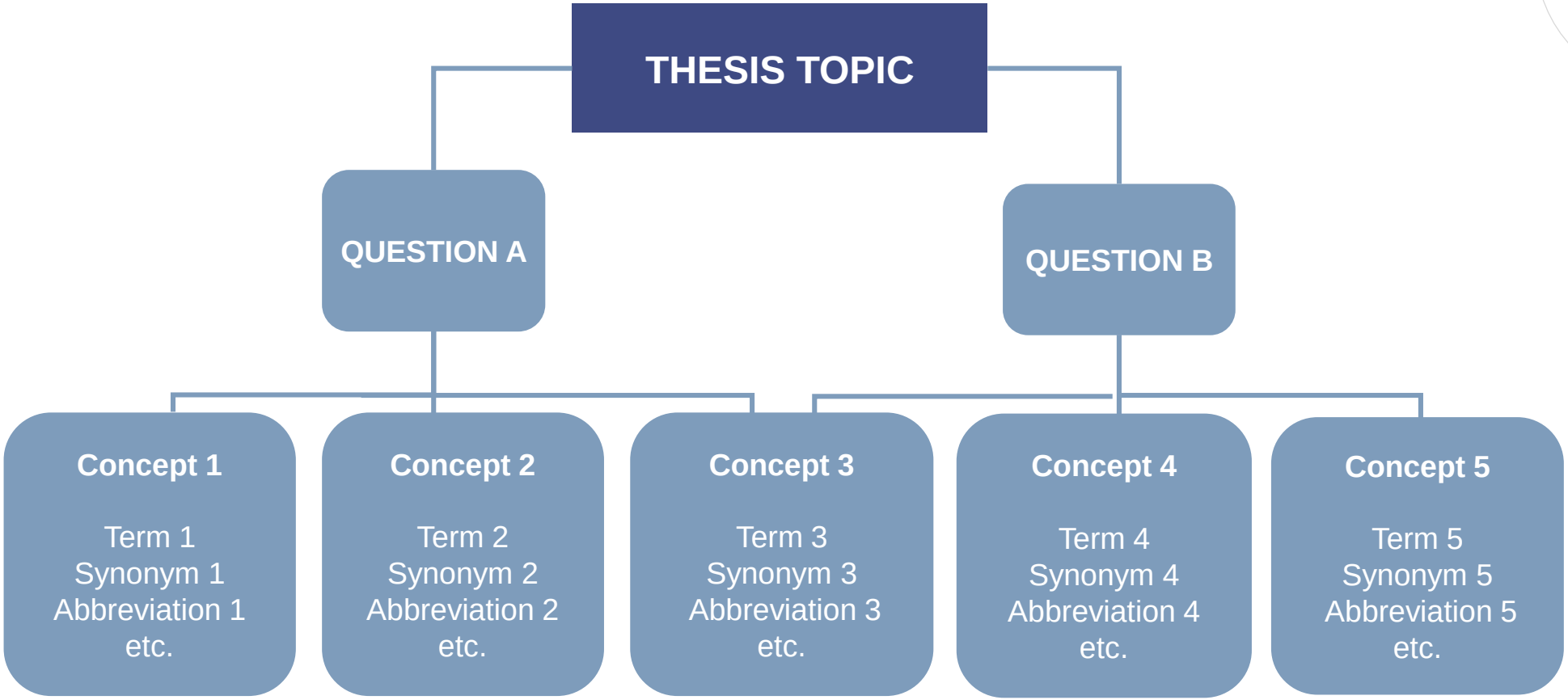
Define the research question and the concepts

→ **Look for the publications of a well-known expert**

When an expert of the field has been identified, add his/her publications

Formulate the question

01
Formulate



Terminology ressources

01
Formulate

Grand dictionnaire terminologique

Wikipedia

International Electrotechnical Commission

INIS thesaurus

ITU Terms and Definitions

Search Query

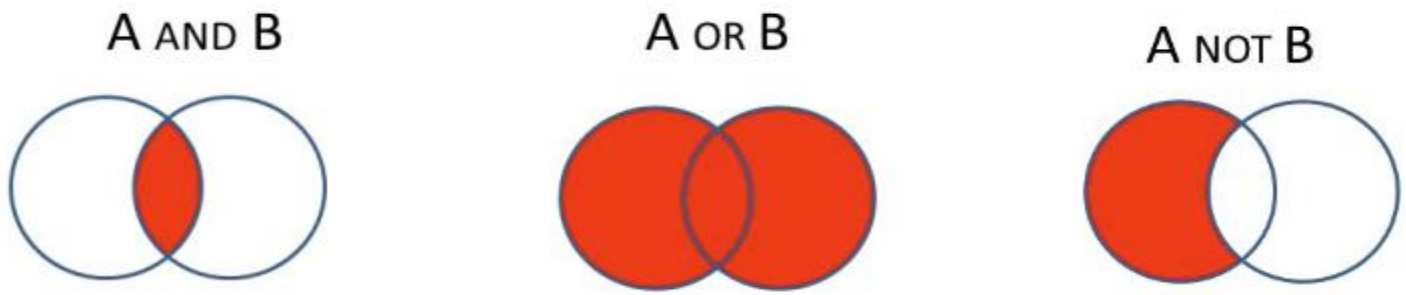
02
Search

BOOLEAN OPERATORS

AND : Search records where the two terms are found

OR : Search records containing at least one of the two terms

NOT : Records where one of the words is found but not the other



Search Query

02
Search

OTHER OPERATORS

- **Proximity Operators: NEARx, W/x, PRE/x,… (distance x)**

  turbulent NEAR/4 flow
  - turbulent water flow
  - turbulent two-phase flow
  - turbulent and steady state liquid flow
  - flow of turbulent character

turbulent AND flow

- **Quotation marks " " to search for an exact phrase**

" turbulent flow "

~~**turbulent two-phase flow**~~

- **Truncation & wilcards: *, ?, $**
  - combin* → combine, combined, combination, …
  - characteri?ation → characterisation, characterization
  - behavio$r → behaviour, behavior
  - micro$alga → micro-alga

- **Brackets for the distributivity**

Build the query

→ Build the advanced search strategy

Break down the search into the different identified key concepts.

To get a clear final query :

Use one line for each key concept
and
Combine each line together

→ Try out several keywords combination

In order to get the right balance of relevant results to answer the question

Keywords and efficiency

Objective: optimize database interrogation methods to maximize the number of usable results

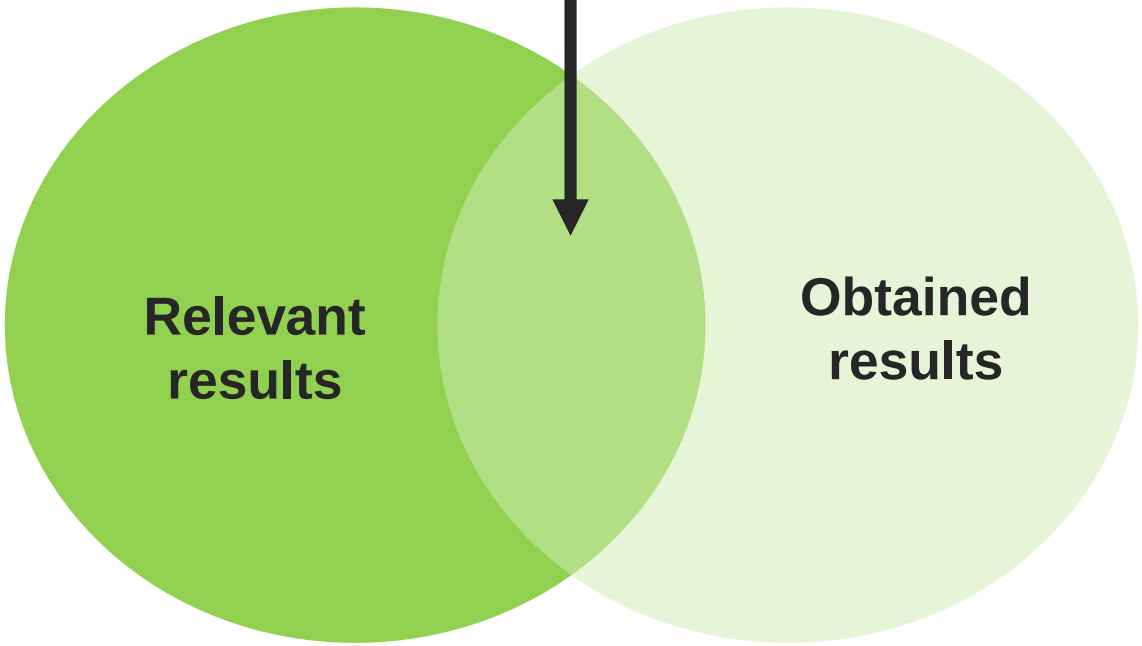
Meaningful results

Silence

-

Not enough results

Try broader search terms or remove the phrase searching



Noise

-

Too many results

- Use specific terms
- Add additional keywords to narrow the focus

Search Query

02
Search

Concept 1 AND Concept 2

FIELD 1 = (Term A OR Synonym A OR Term B OR Synonym B) AND

FIELD 2 = (Term C OR Synonym C OR Term D OR Synonym D)

Example : tritium trapping / detritiation

Concept 1: Tritium, tritiated, hydrogen isotope

Triti* OR (hydrogen NEAR/2 isotop*)

Concept 2: trapping, stripping, capturing, removing, absorbing, …

Trap* OR strip* OR captur* OR remov* OR a B sor* OR a D sor*

Search Query

02
Search

Concept 1 AND Concept 2

FIELD 1 = (Term A OR Synonym A OR Term B OR Synonym B) AND

FIELD 2 = (Term C OR Synonym C OR Term D OR Synonym D)

Example : tritium trapping / detritiation

Concept 1+2: detritiation

TS=((triti* OR (hydrogen NEAR/2 isotop*)) AND
(trap* OR strip* OR captur* OR remov* OR a?sor* ….)) OR
TI=(detritiati*)

Summary

Key concepts

→ Synonyms
→ Acronyms & abbreviations
→ Spelling alternatives
→ Truncation + wildcard : singular / plural – verb conjugating

Operators

→ Boolean operators
→ proximity operators
→ Searched concepts always separated by an operator

Build the search strategy

Build the query

→ Break down the query
→ Combine the steps with Boolean operators
→ Try to combine various questions

Example

Subject :

Additive manufacturing of stainless steel

- **Concept 1** Additive manufacturing
- **Concept 2** Stainless steel

Concept 1 : Additive manufacturing

- 3D printing, 3-dimensional printing, three-D printing,..
- Powder bed fusion (PBF)
- Electron beam melting (EBM)
- Selective laser melting (SLM)
- Selective laser sintering (SLS)
- Direct metal laser sintering (DMLS)
- Laser metal deposition (LMD)
- Direct energy deposition (DED)
- Extreme high-speed laser cladding (EHLA)
- Electron beam freeform fabrication (EBF3)
- Wire-arc additive manufacturing (WAAM)

3D printing

59 languages

Article Talk | Read View source View history Tools

From Wikipedia, the free encyclopedia

For methods of transferring an image onto a 3D surface, see pad printing. For methods of generating autostereoscopic lenticular images, see lenticular printing and holography.

3D printing or **additive manufacturing** is the construction of a three-dimensional object from a CAD model or a digital 3D model.[1][2] It can be done in a variety of processes in which material is deposited, joined or solidified under computer control,[3] with the material being added together (such as plastics, liquids or powder grains being fused), typically layer by layer.

3D printing processes

Article Talk

From Wikipedia, the free encyclopedia

A variety of processes, equipment, and materials are used in the production of a three-dimensional object via additive manufacturing. 3D printing is also known as additive manufacturing, because the numerous available 3D printing process tend to be additive in nature, with a few key differences in the technologies and the materials used in this process.

Some of the different types of physical transformations which are used in 3D printing include melt extrusion, light polymerization, continuous liquid interface production and sintering.

Types of 3D printing processes [edit]

There are many different 3D printing processes, that can be grouped into seven categories:[1]

- Vat photopolymerization
- Material jetting
- Binder jetting
- Powder bed fusion
- Material extrusion
- Directed energy deposition
- Sheet lamination

Type	Technologies	Materials
Material jetting	Drop-on-demand or continuous (single- or multi-nozzle) particle deposition	Hot-melt materials (wax, thermoplastic, metal alloy), dispersed materials (technical ceramics, metals, polymers)
Material extrusion	Fused deposition modeling (FDM) or fused filament fabrication (FFF) and fused pellet fabrication or fused particle fabrication	Thermoplastics, eutectic metals, edible materials, rubbers, modeling clay, plasticine
	Robocasting or MIG welding 3D printing[11] or direct ink writing (DIW) or extrusion based additive manufacturing of metals (EAM) and ceramics (EAC)	Metal-binder mixtures such as metal clay, ceramic-binder mixtures (including ceramic clay and ceramic slurries), cermet, metal matrix composite, ceramic matrix composite, metal (MIG welding)[11]
	Additive friction stir deposition (AFSD)	Metal alloys
	Composite filament fabrication (CFF)	Nylon or nylon reinforced with carbon, Kevlar or glass fibers
Light polymerized	Stereolithography (SLA)	Photopolymer (including preceramic polymers)
	Digital light processing (DLP)	Photopolymer
	Continuous liquid interface production (CLIP)	Photopolymer + thermally activated chemistry
Powder Bed	Powder bed and inkjet head 3D printing (3DP)	Almost any metal alloy, powdered polymers, Plaster
	Electron-beam melting (EBM)	Almost any metal alloy including titanium alloys
	Selective laser melting (SLM)	Titanium alloys, cobalt-chrome alloys, stainless steel, aluminium
	Selective heat sintering (SHS)[12]	Thermoplastic powder
	Selective laser sintering (SLS)	Thermoplastics, metal powders, ceramic powders
	Direct metal laser sintering (DMLS)	Metal alloys
Laminated	Laminated object manufacturing (LOM)	Paper, metal foil, plastic film
Powder fed	Laser metal deposition (LMD) or Directed Energy Deposition (DED)	Metal alloys
	Extreme high-speed laser cladding (EHLA)[13]	Metal alloys
Wire	Electron beam freeform fabrication (EBF^3)	Metal alloys
	Wire-arc additive manufacturing (WAAM)	Metal alloys

Concept 1 : Additive manufacturing

(3D OR “3 D” or “three D” OR “three dimensional”) NEAR/1 print*) OR “additive manufactur*”

OR

(“powder bed fus*” OR “electron beam melt*” OR “selective laser melt*” OR “selective laser sinter*” OR “direct metal laser sinter*” OR “laser metal deposit*” OR “direct* energy deposit*” OR “extreme high speed laser clad*” OR “electron beam freeform fabricat*” OR “wire arc additive manufactur*”)

OR

PBF OR EBM OR SLM OR SLS OR DMLS OR LMD OR DED OR EHLA OR EBF3 OR WAAM

Concept 2 : Stainless steel

- stainless steel
- austenitic (stainless) steel
- martensitic (stainless) steel
- ferritic (stainless) steel
- duplex (stainless) steel
- precipitation hardening (stainless) steel
- SS316, (SS)316L, (SS)316N
- SS304, (SS)304L, (SS)304N

Types [edit]

Stainless steel is classified into five main families that are primarily differentiated by their crystalline structure:

- austenitic
- ferritic
- martensitic
- duplex
- precipitation hardening

Concept 2 : Stainless steel

stainless NEAR/2 steel

OR

SS316 OR SS316L OR 316L OR SS16N OR 316N OR SS304 OR SS304L OR 304L OR SS304N OR 304N

Exercise

Subject :

Wire diagnosis using reflectometry
to detect faulty wires

- **Concept 1** wire
- **Concept 2** fault
- **Concept 2** reflectometry

Which sources and tools to use ?

03
Identify

Internet

Google
Google Scholar
DuckDuckGo
ECOSIA

Social networks

ResearchGate
Academia.edu

Bibliographic databases

WEB OF SCIENCE
IET The Institution of Engineering and Technology
Scopus
IEEE Advancing Technology for Humanity
SciFinder A CAS SOLUTION
INIS AIEA
PubMed
astrophysics data system
bioRxiv
HAL archives-ouvertes.fr
arXiv.org
Europäisches Patentamt
European Patent Office
Office européen des brevets
Orbit Intelligence

Which use of Google and Google Scholar ?

03
Identify

Google

Google Scholar

Queries

- Search often based on a few keywords
- Limited advanced search
- No confidentiality

Outcomes

- No exhaustiveness and no sorted results
- A lot of noise
- Confirmation bias
- No reproducible results

from  to 

Very good to become familiar with a subject
(upstream to the state-of-the-art)

Which use of bibliographic databases ?

03
Identify

WEB OF SCIENCE™ Scopus IEEE Advancing Technology for Humanity IET The Institution of Engineering and Technology

More structured sources

Queries

- Advanced search interface
- Possible complex queries
- Saved queries

Outcomes

- Exhaustive results
- More relevant results
- Filters on results
- Grouped export of results

Perfect for a state-of-the-art

Scientific and technical documentation

03
Identify

- Scientific journal articles
- Conference proceedings
- Patents
- Technical reports
- Theses
- Technical articles in trade magazine
- Research data
- Standards
- Books, Monographs
- Protocols
- …

Bibliographic Databases

03
Identify

- Secondary sources for searching across various primary sources
- Made up of a collection of bibliographic records
- It is defined by its coverage, more specifically how the base is constituted
- The articles are read by librarians and the items are reworked and indexed

Examples of Bibliographic Databases

03
Identify

Specialized Bibliographic databases

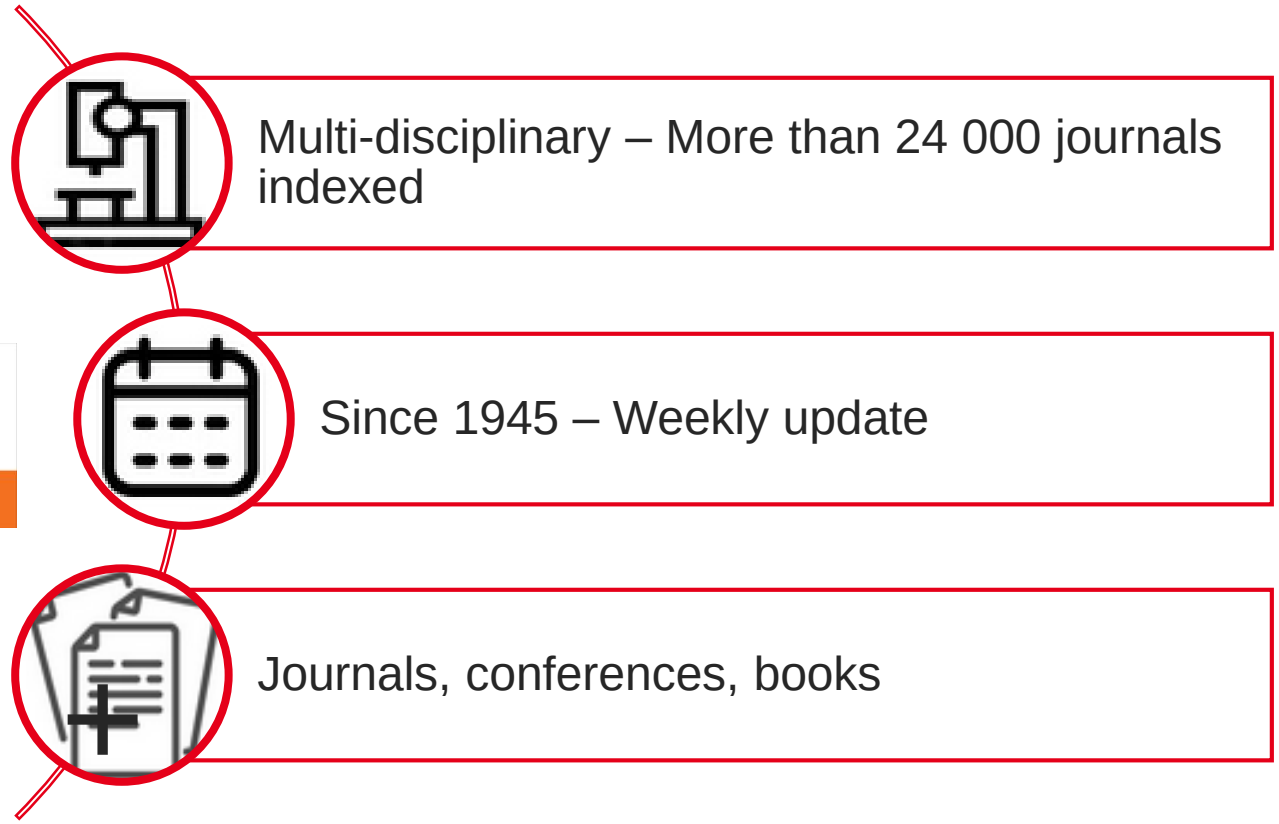
Database	Supplier	Field
Materials Science & Engineering Collection	ProQuest	Material Science & Engineering
INIS FREE	IAEA International Atomic Energy Agency	Civil nuclear applications
INSPEC	IET The Institution of Engineering and Technology	Physics, Electronics, Computer Science
Pubmed FREE	NIH National Library of Medicine National Center for Biotechnology Information	Biology, Medecine
Reaxys	ELSEVIER	Chemistry
SciFinder	CAS	Chemistry

Multi-disciplinary Citation databases

Database	Supplier
Web of Science	Clarivate™
Scopus	ELSEVIER

How to search in WoS and Scopus

Web of Science



Source : Freepik

https://www.webofscience.com/wos

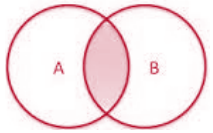
Operators

Web of Science™

WEB OF SCIENCE

AND
OR
NOT

Boolean operators



Proximity operators

***** : multi-character

? : 1 character

$: 0 or 1 character

Wildcards

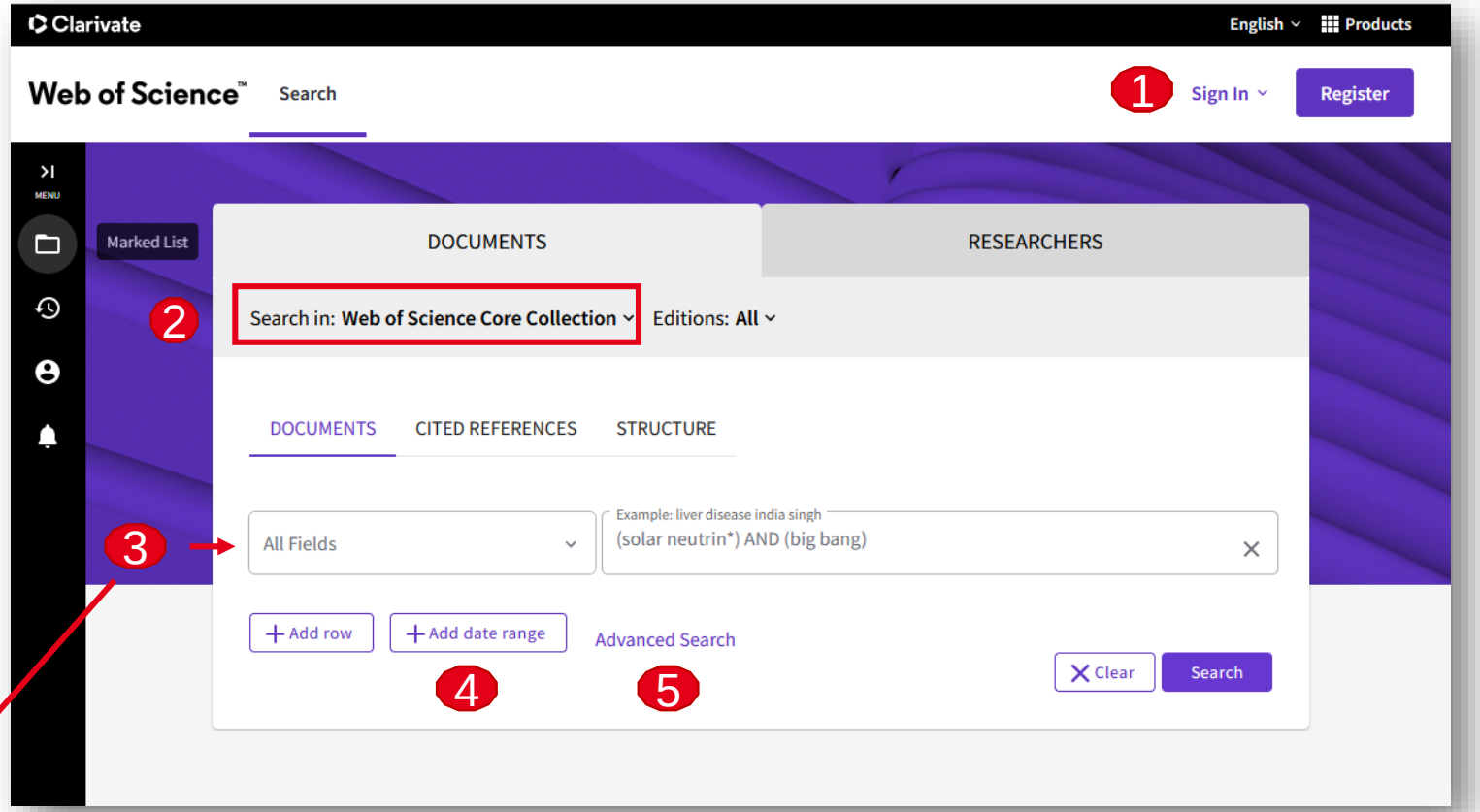
NEAR/n : terms joined by the operator are within a specified number of words of each other (no specific order)

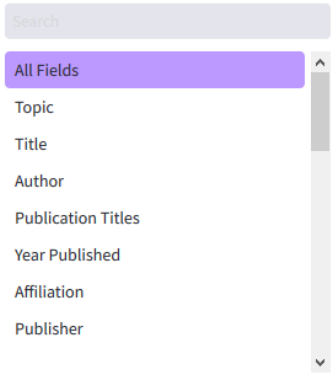
"expression" : to search for a specific phrase, punctuation is ignored, wildcards can be used

WoS user-interface

Web of Science™

1- Create an account / Login: Registration required to save results lists, searches and create alerts
2- Database choice (for more relevant searches, query in one database at a time)
3- Search fields
4- Timespan settings
5- Link to advanced search

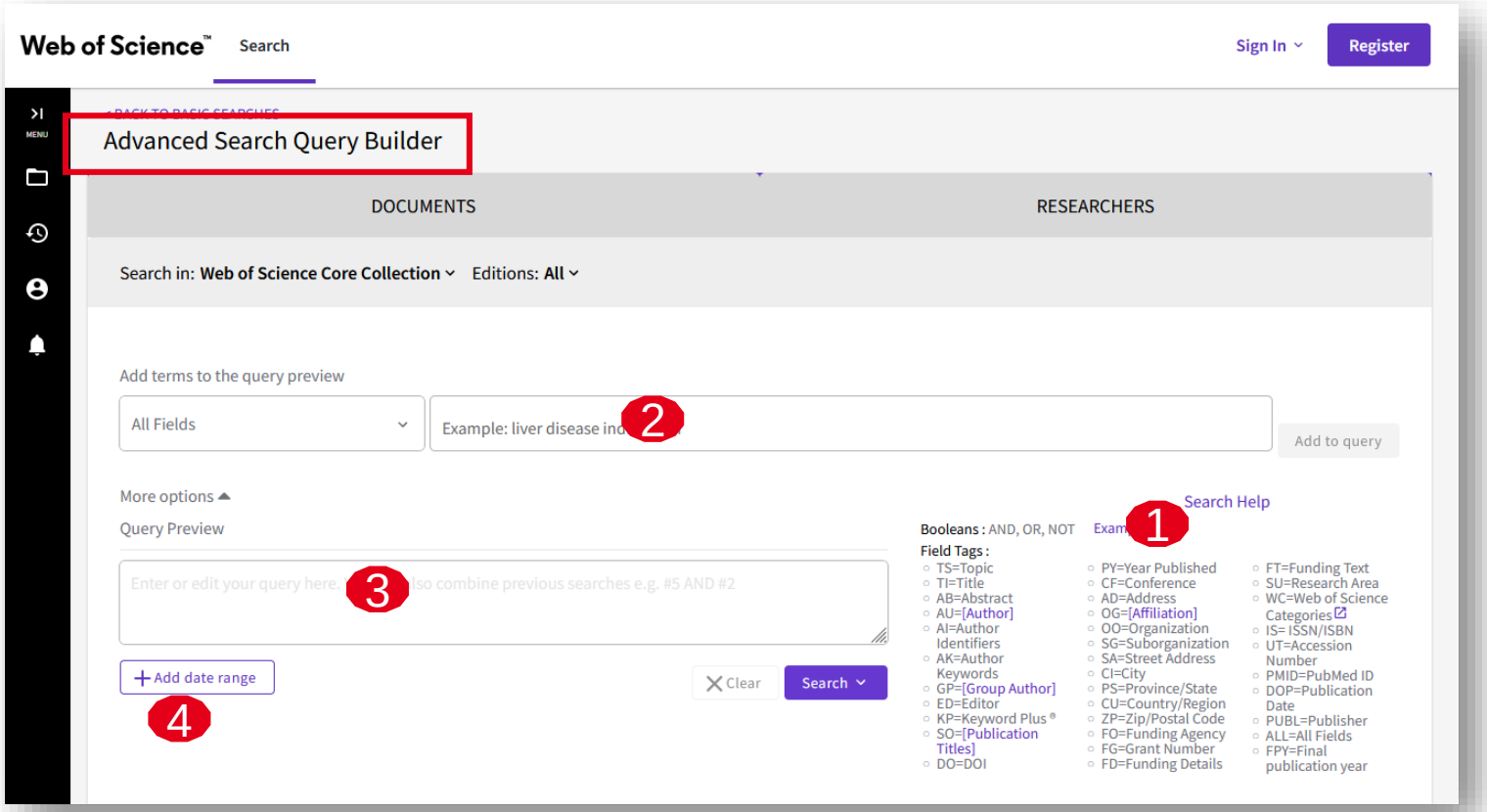




Advanced search

Web of Science™

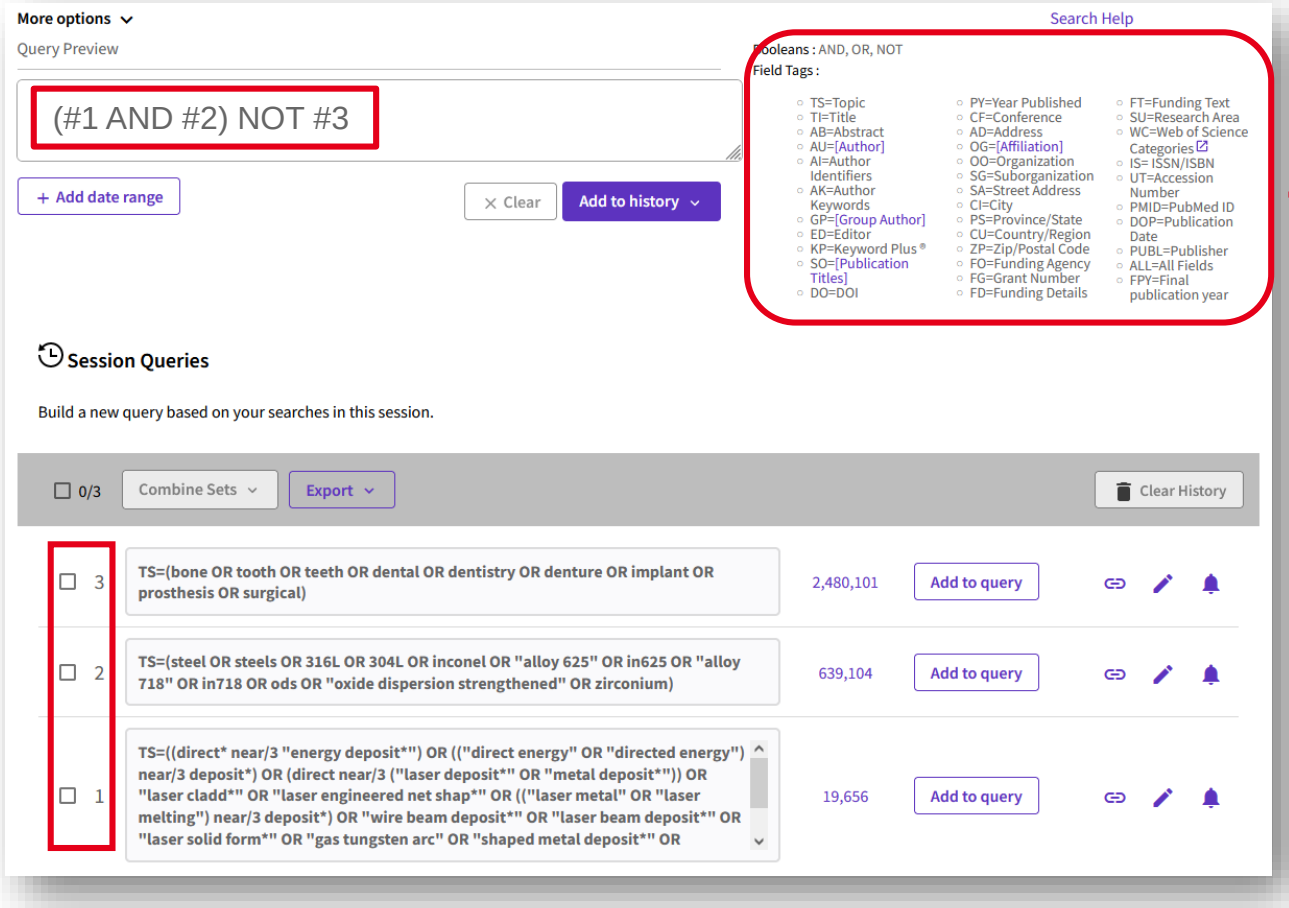
1- Advanced search using boolean operators and search fields
2- Basic query builder
3- Query preview + combine queries
4- Timespan settings



Information search

Web of Science™

Link to advanced search on home page



Boolean operators and field tags

Remember to use the **advanced search** to **break down** your search into several steps and use the **search history** to combine the queries

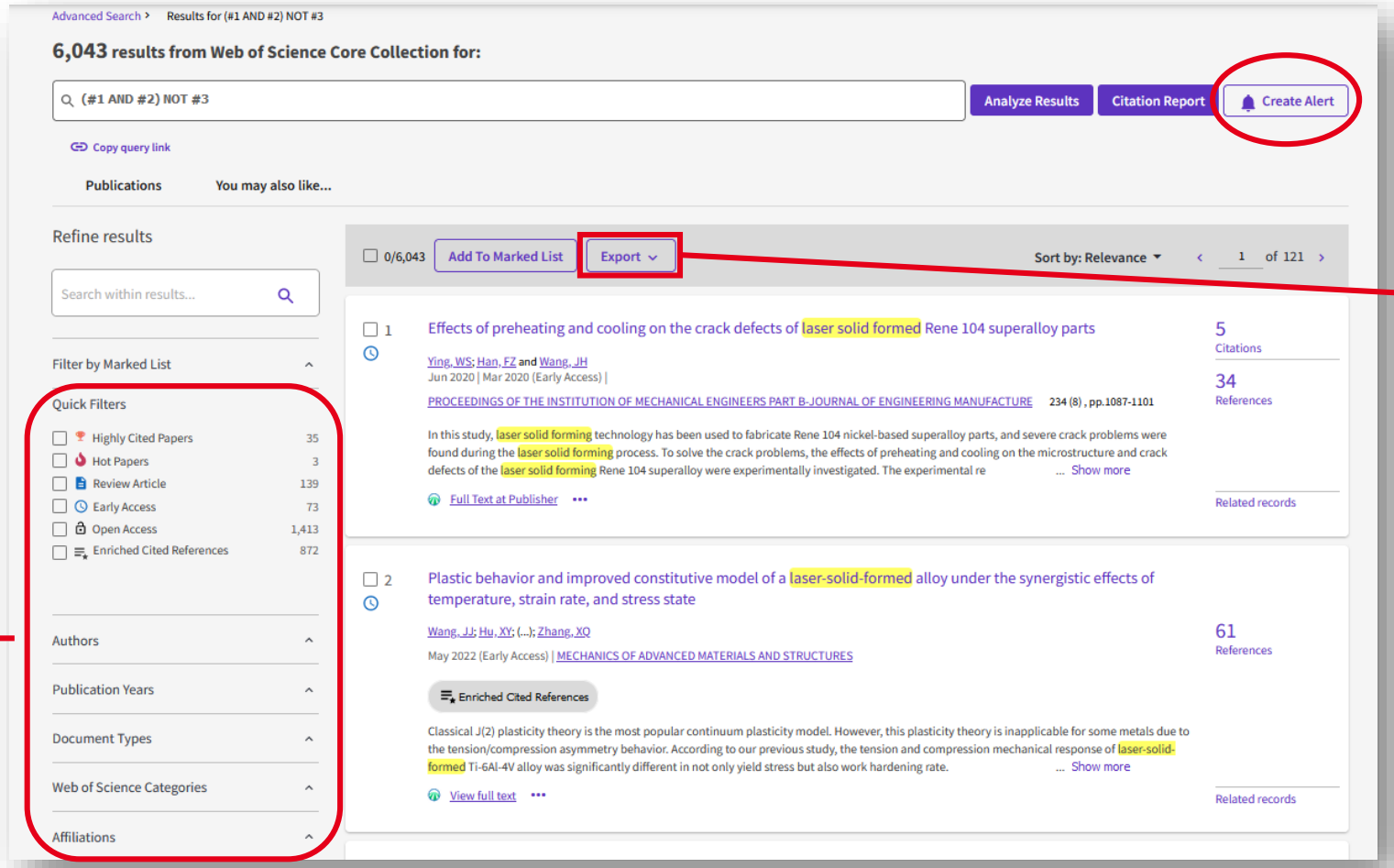
Search history

Search results

Web of Science™

→ Filter and export results

Use the features available on the results page: additional **filters**, **export** results, **save query** and set up **alerts**



Create alert

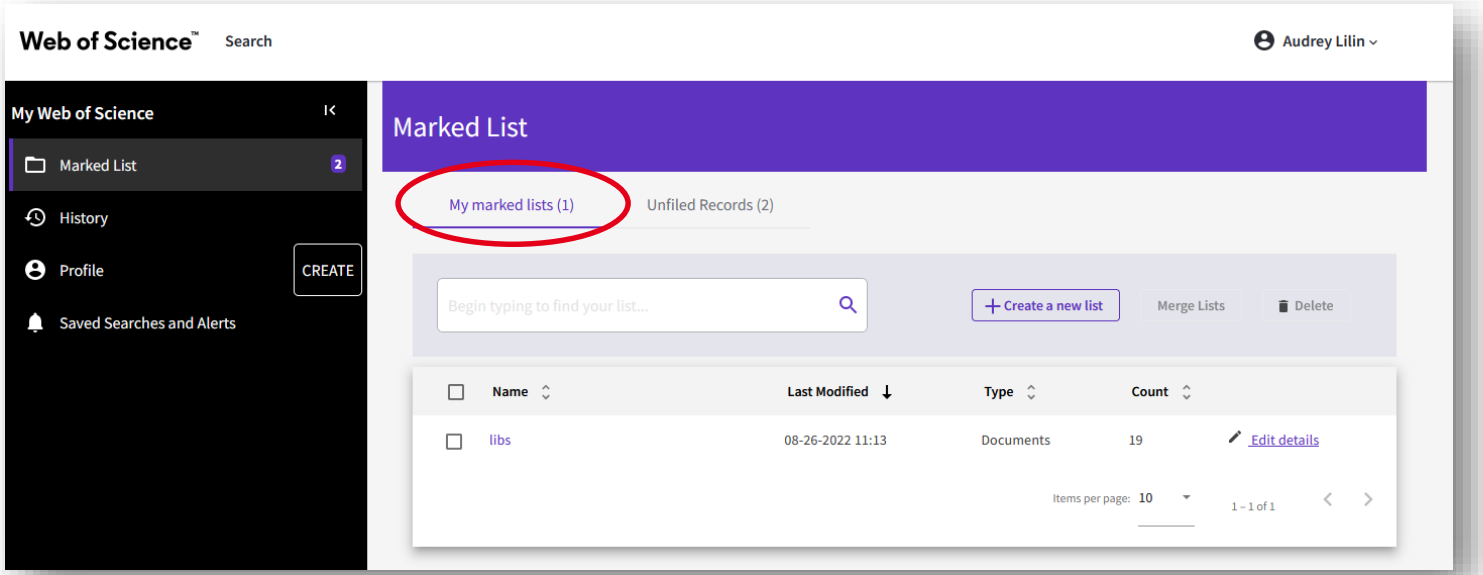
Export

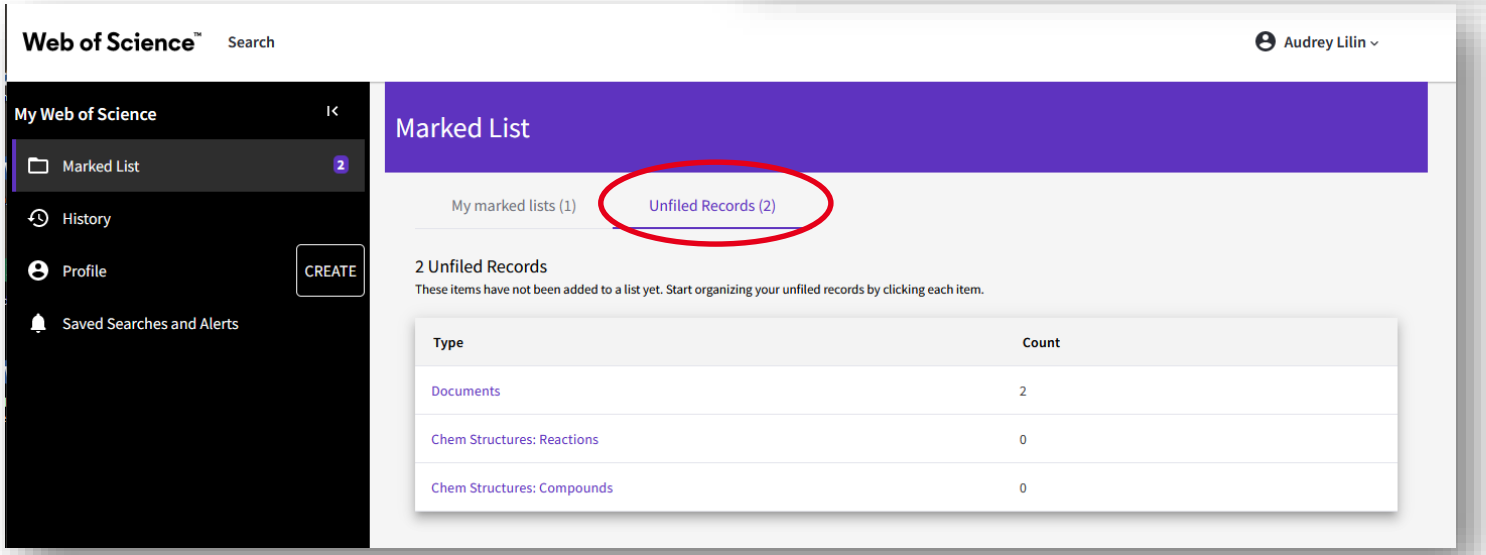
Filters

Marked lists

Web of Science™

Saved Marked Lists





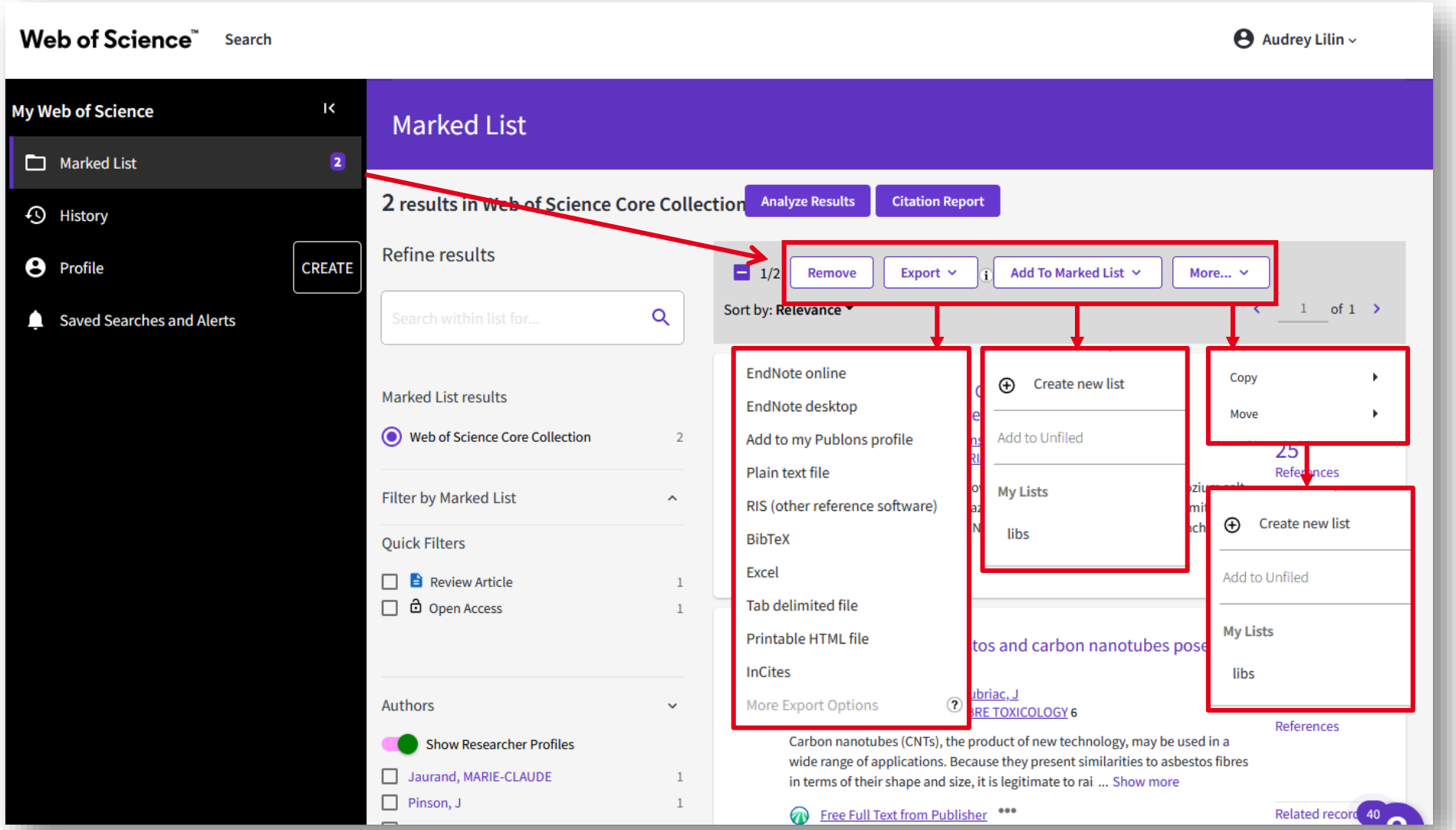
Unsaved Marked Lists

Use of marked lists

Web of Science™

50 Marked Lists maximum

Possibility of adding references

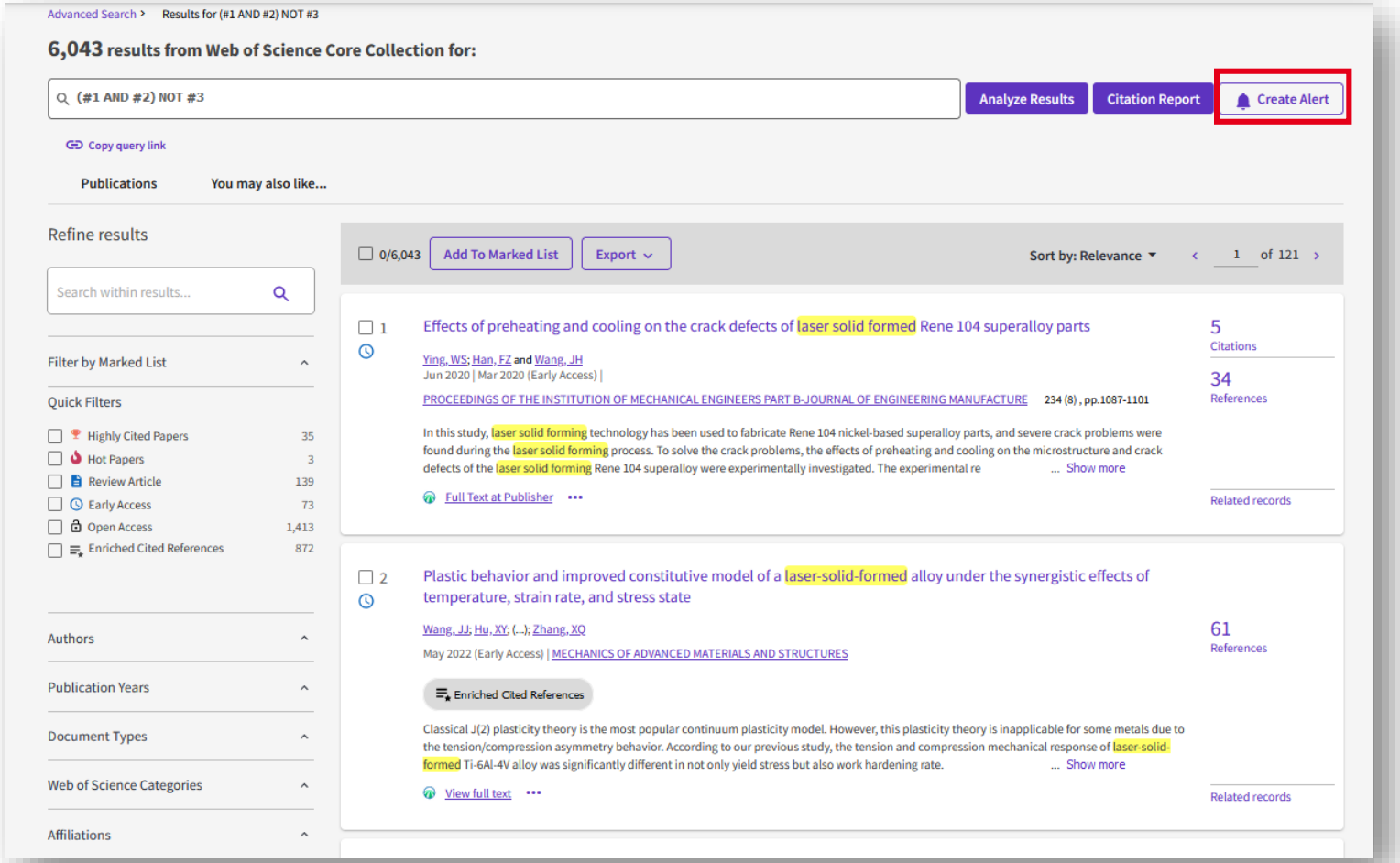


Alerts to update the results

Web of Science™

From results:

Available from results page and search history



Create alert

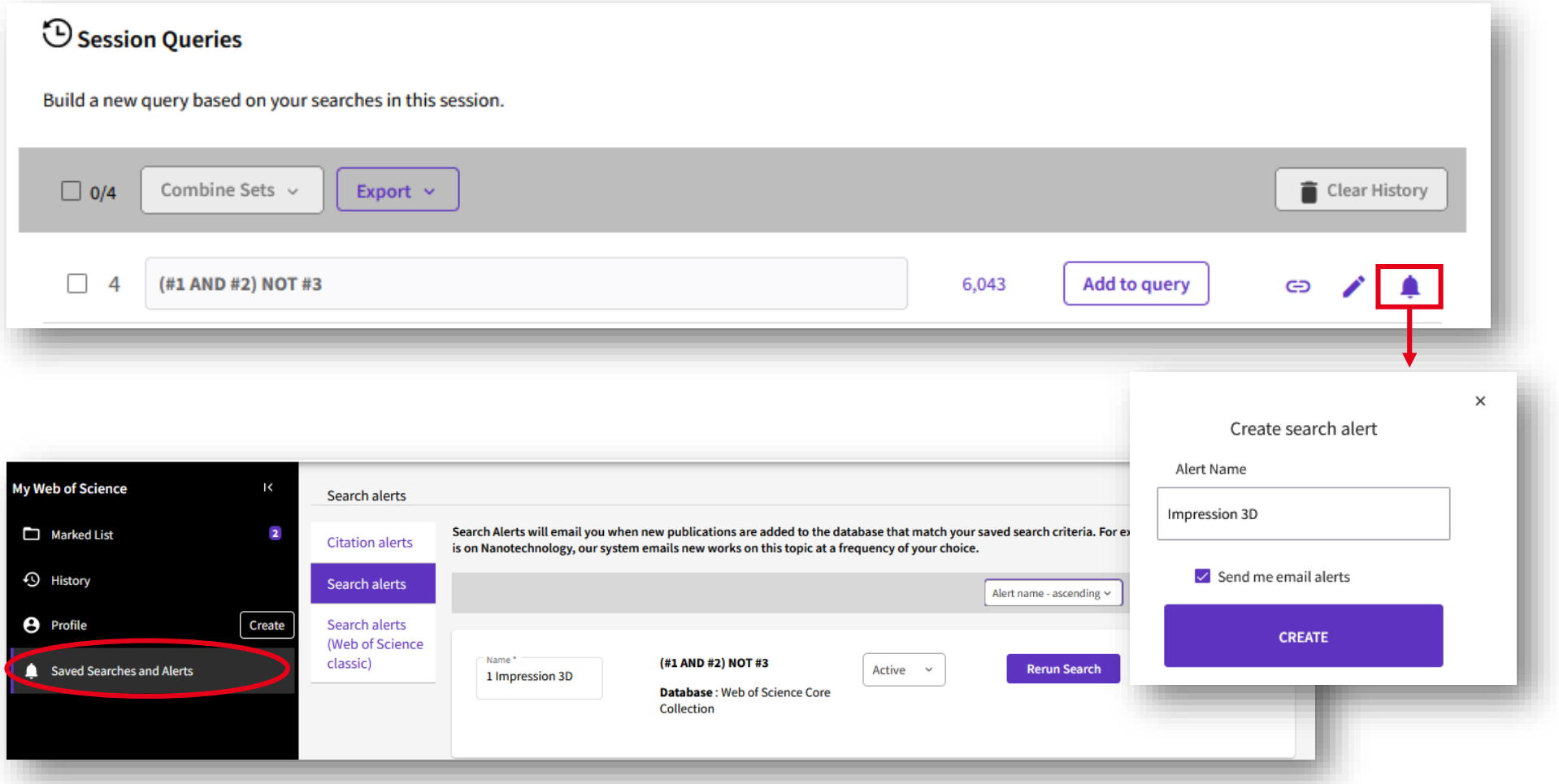
CAUTION

Do not mention a date in the alert, nor a specific time period

Alerts to update the results

Web of Science™

From search history:



Example : searching ‘Additive manufacturing of stainless steel’

- **Concept 1** Additive manufacturing

TS=(((3D OR “3 D” or “three D” OR “three dimensional”) NEAR/1 print*) OR “additive manufactur*” OR (“powder bed fus*” OR “electron beam melt*” OR “selective laser melt*” OR “selective laser sinter*” OR “direct metal laser sinter*” OR “laser metal deposit*” OR “direct* energy deposit*” OR “extreme high speed laser clad*” OR “electron beam freeform fabricat*” OR “wire arc additive manufactur*”) OR (PBF OR EBM OR SLM OR SLS OR DMLS OR LMD OR DED OR EHLA OR EBF3 OR WAAM))

- **Concept 2** Stainless steel

TS=((stainless NEAR/2 steel) OR (SS316 OR SS316L OR 316L OR SS16N OR 316N OR SS304 OR SS304L OR 304L OR SS304N OR 304N))

Exercise : queries in WoS

Concept 1 : reflectrometry :

#1 TS=(reflectometr* OR TDR OR FDR OR ellipsomet*)

Concept 2 : cables :

#2 TS=(cable OR wire OR wiring OR line OR « twisted pair »)

Concept 3 : fault :

#3 TS=(fault OR defect* OR « partial discharge » OR anomal* OR abnormal* OR aging OR aged)

#1 AND #2 AND #3

Scopus

- Multi-disciplinary – More than 25 000 journals indexed
- Mainly since 1996 – Daily update
- Journals, conferences, books, reports

Source : Freepik

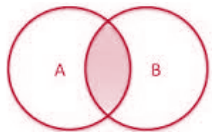
https://www.scopus.com

Operators

Scopus

AND
OR
AND NOT **should always be used at the end of the query**

Boolean operators



Proximity operators

***** : multi-character

? : 1 character

Wildcards

PRE/n : 0 ≤ n ≤ 255, the first term of the query **must precede** the second

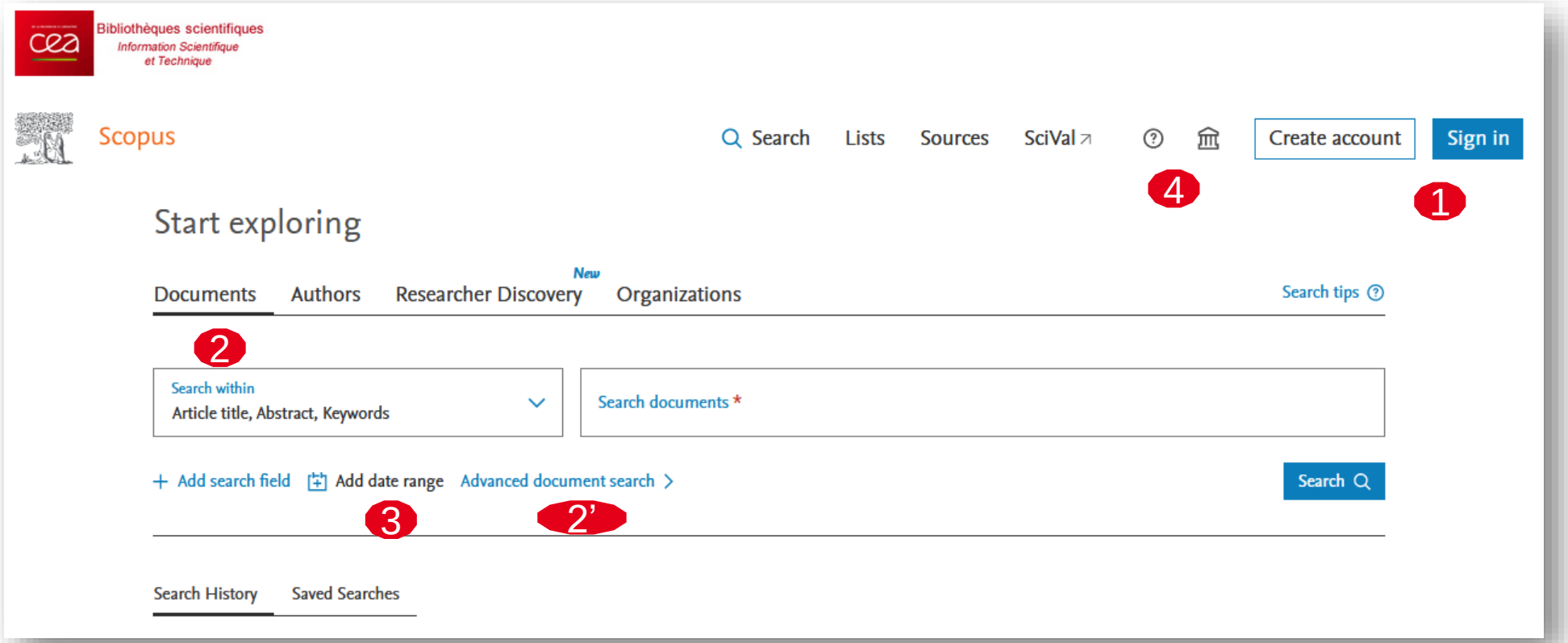
W/n : 0 ≤ n ≤ 255, **no order** between terms

"expression" : to search for a specific phrase, punctuation is ignored, wildcards can be used

Scopus user-interface

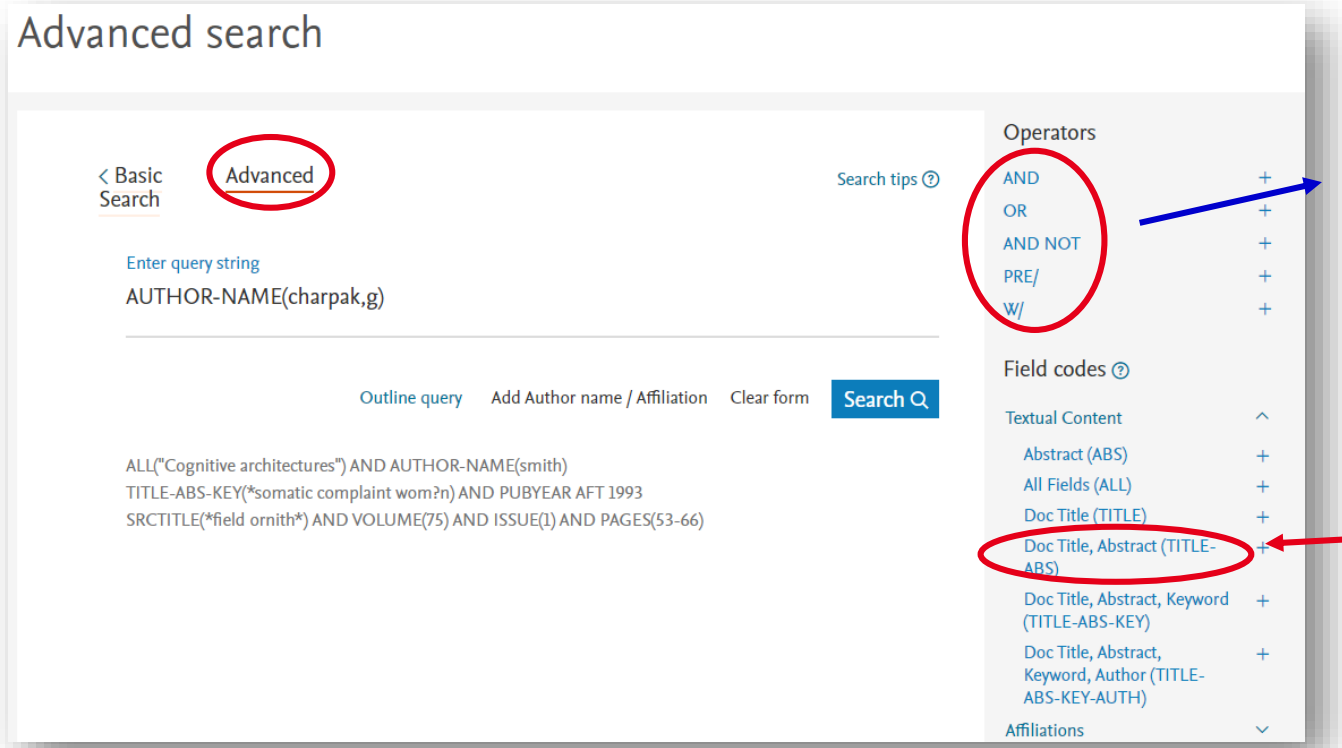
Scopus

1- Create an account / Sign in: Registration required to save results lists, searches and create alerts
2- To choose basic search, advanced search (2'), authors search or organizations search
3- Timespan settings
4- Help



Advanced search

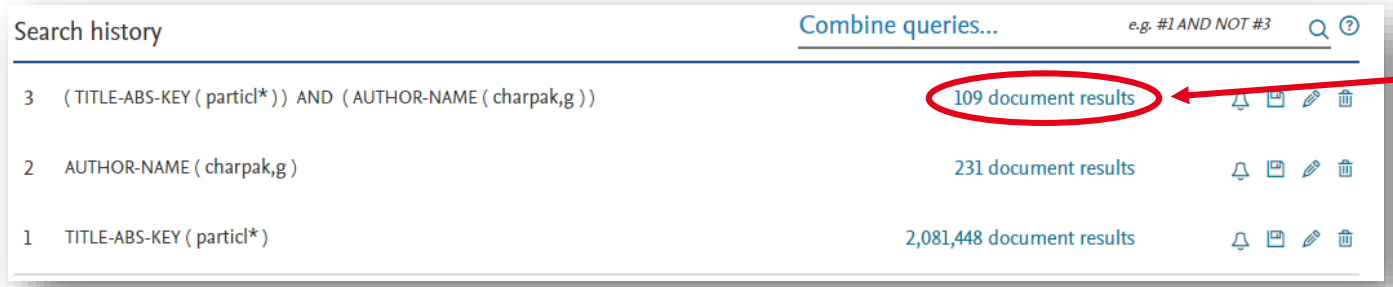
Scopus



AND NOT should always be used at the end of the query

Click on the field code to have information about it

Click on + to add the field code to the search query

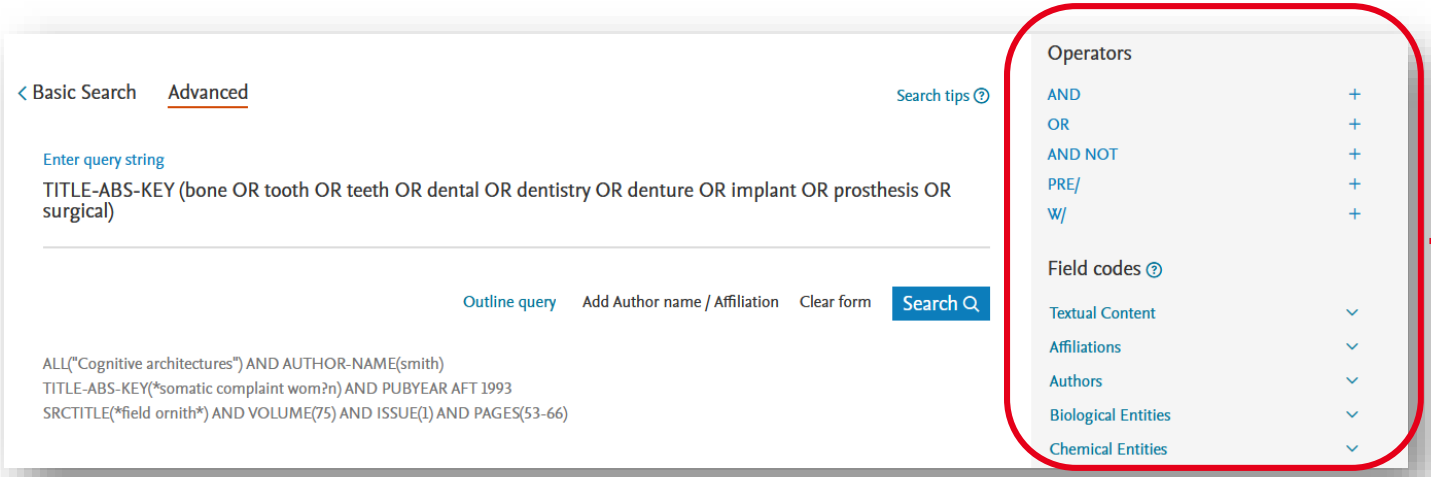


Click to show the results for this search

Information search

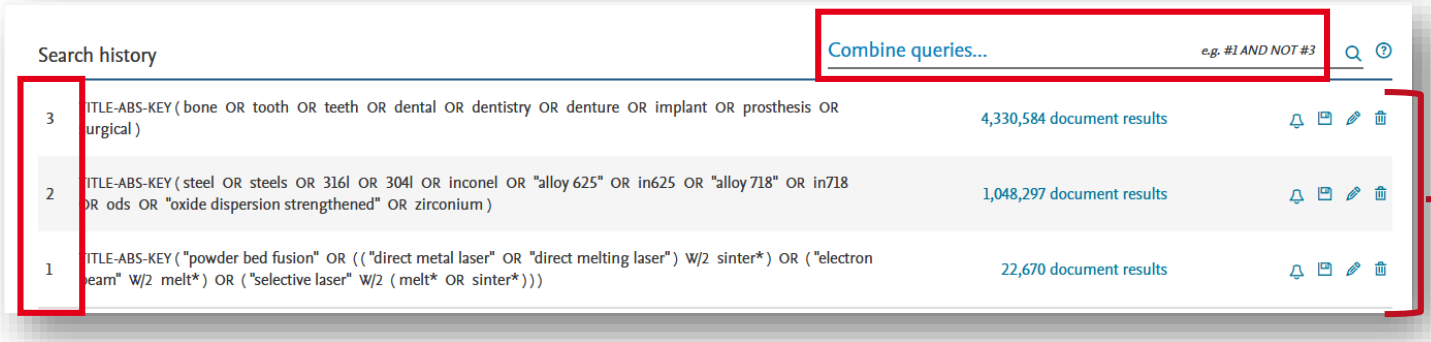
Scopus

Link to advanced search on home page



Operators and field codes

Remember to use the **advanced search** to **break down** your search into several steps and use the **search history** to combine the queries



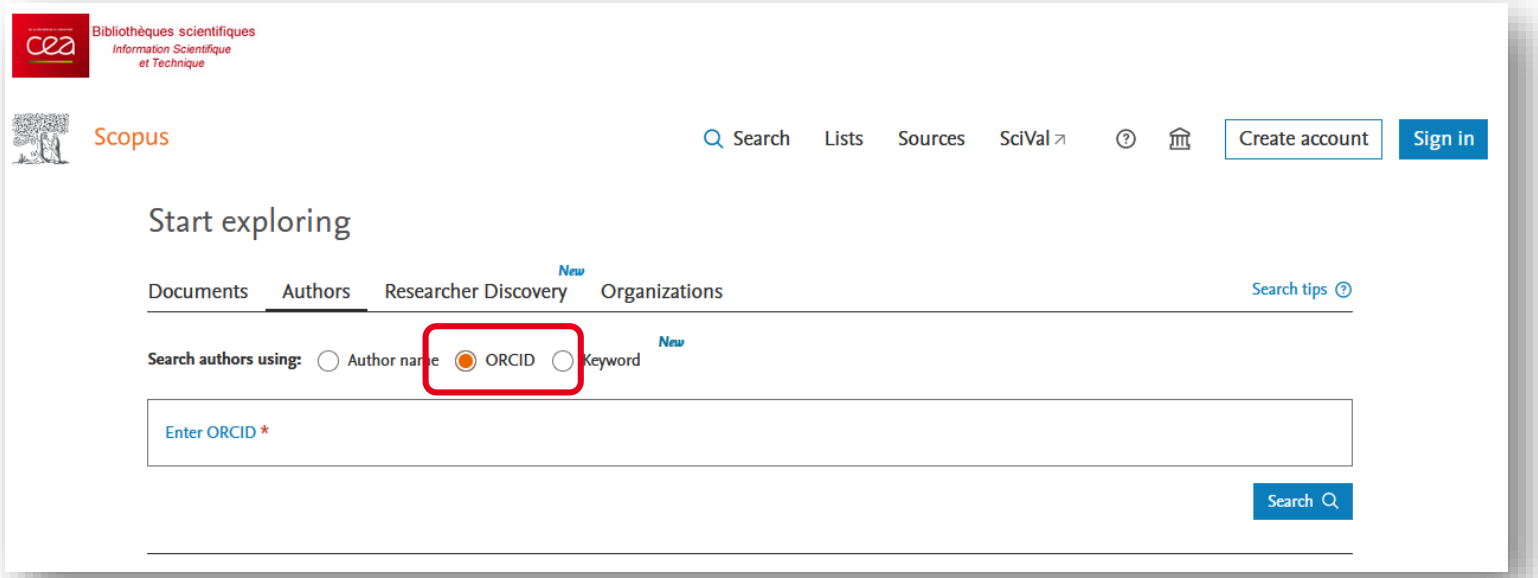
Search history

Information search

Scopus

→ Search for author's publications

Search by ORCID number, when the author has created one

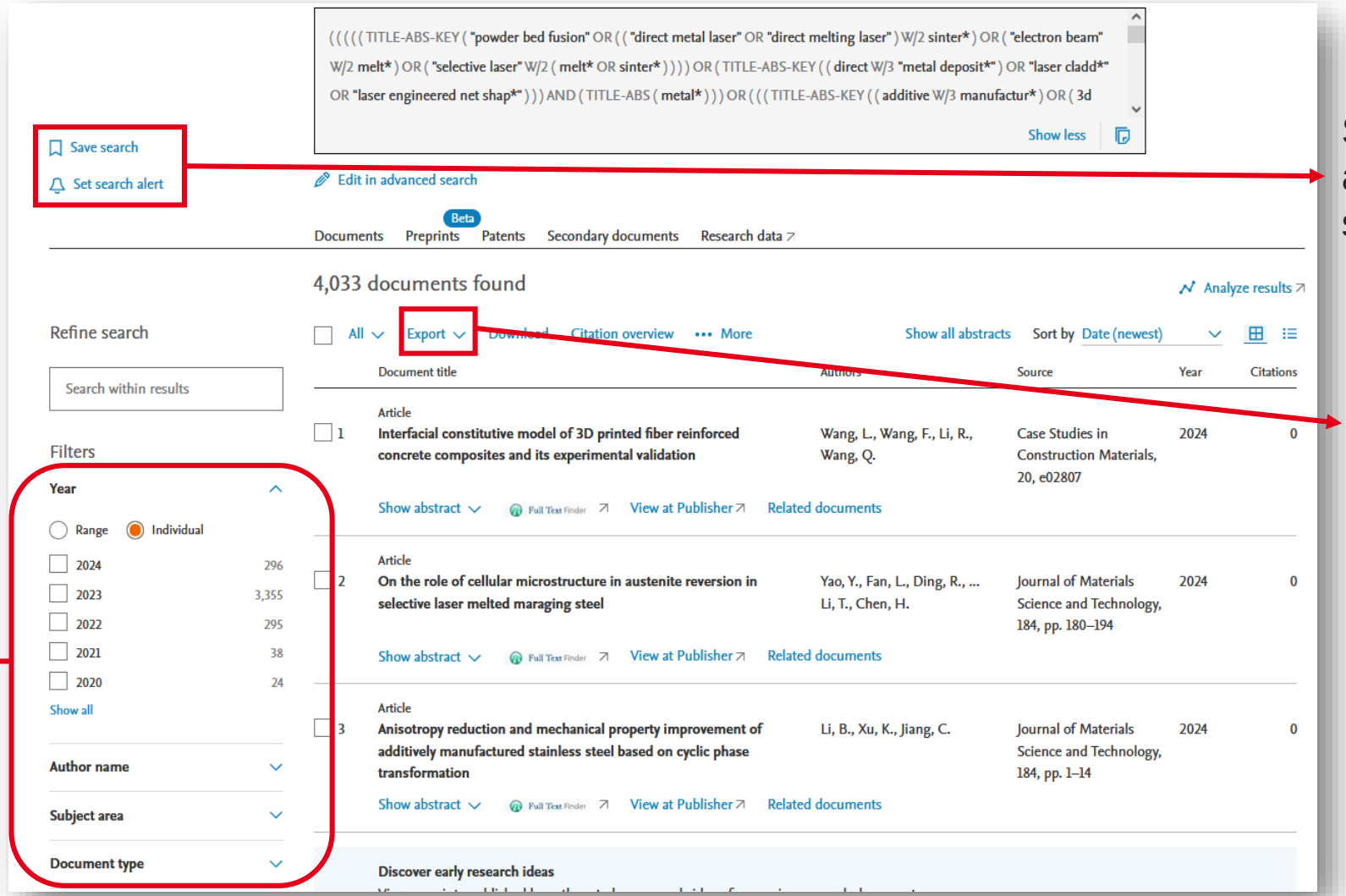


Search results

Scopus

→ Refine search and export results

Use the features available on the results page: additional **filters**, **export** results, **save query** and set up **alerts**



Save search and Set search alert

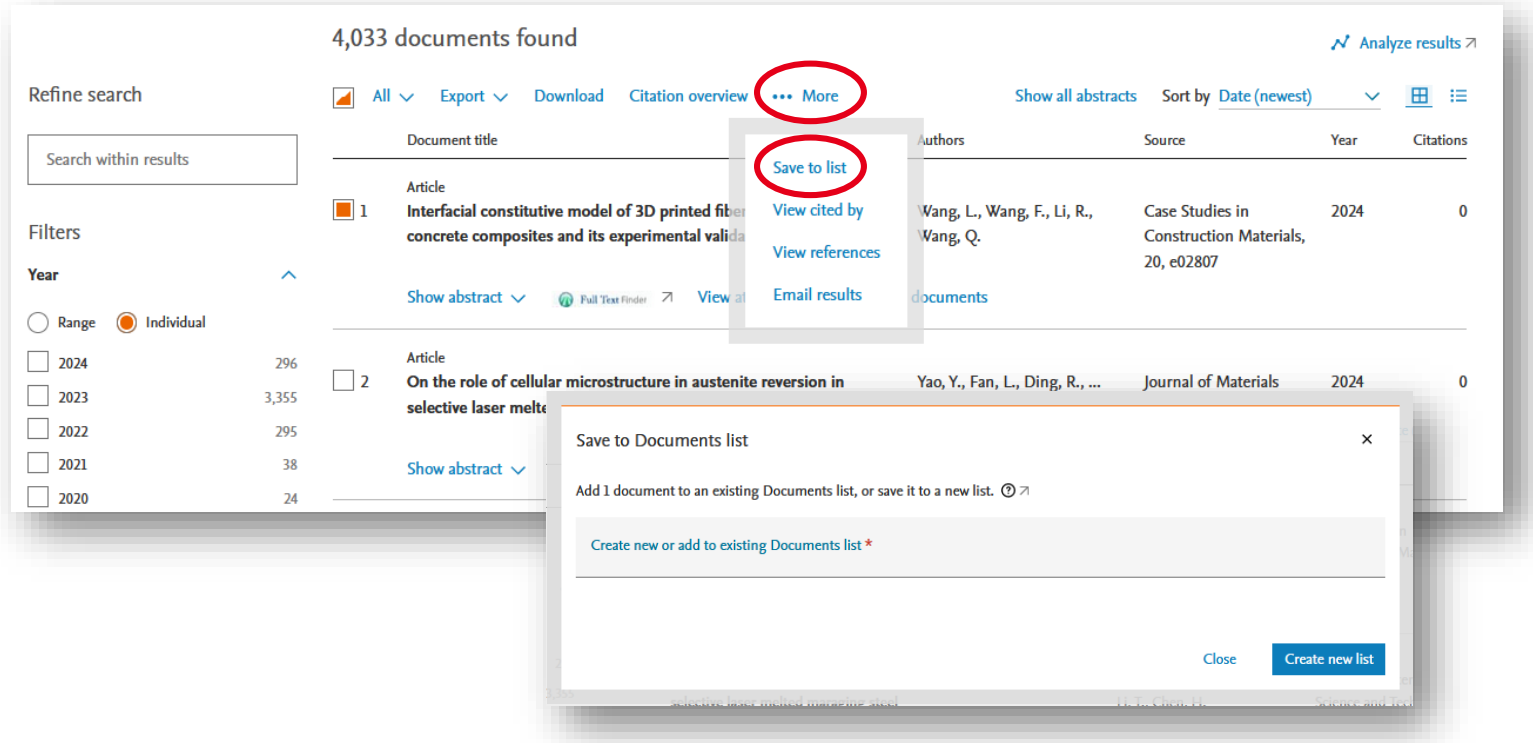
Export

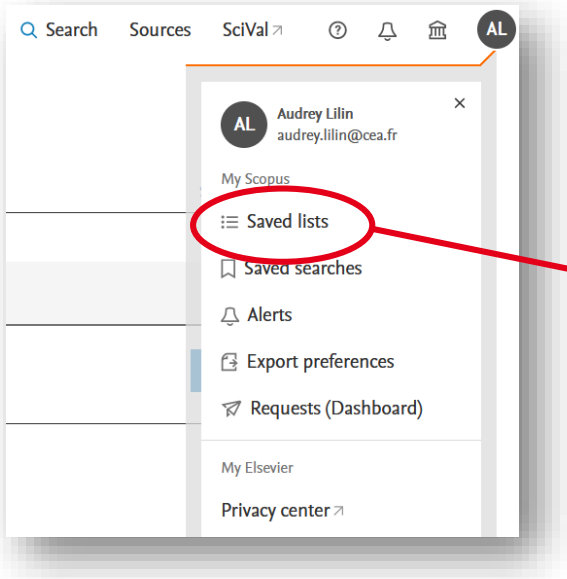
Filters

Use of lists

Scopus

From the results page, select the records to save in a new or existing **list:**



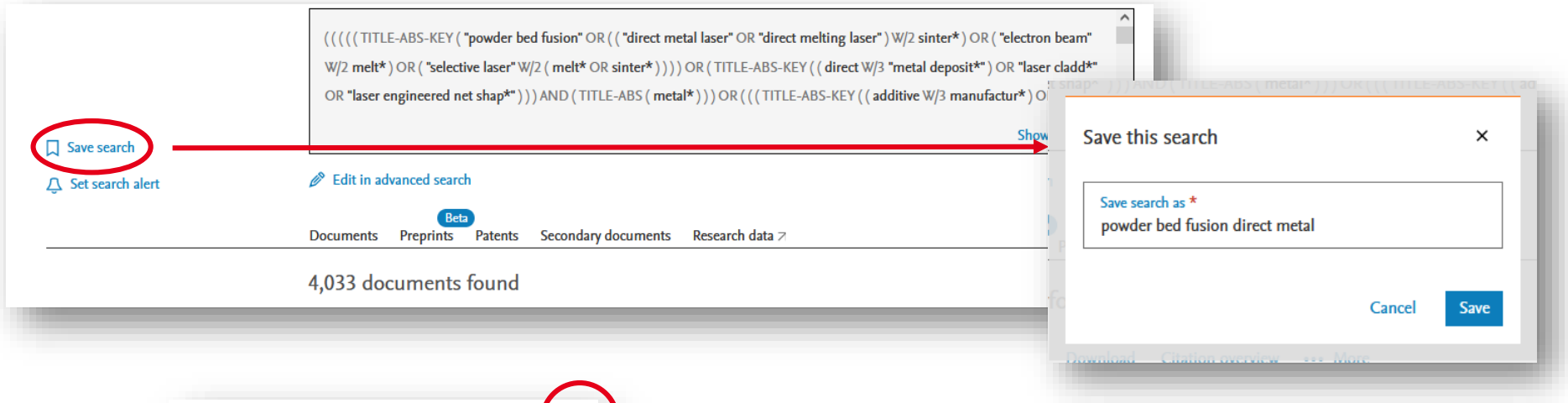


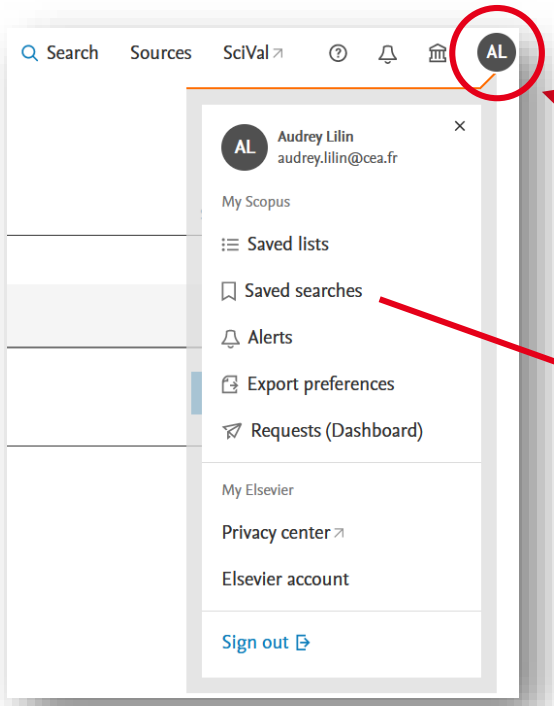
Saved lists

Save the search

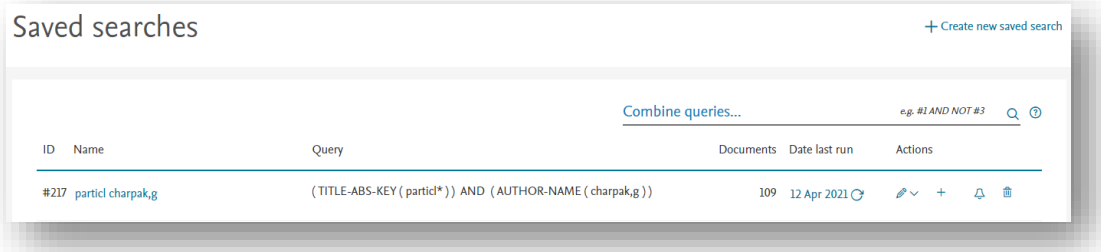
Scopus

From results:





Saved searches



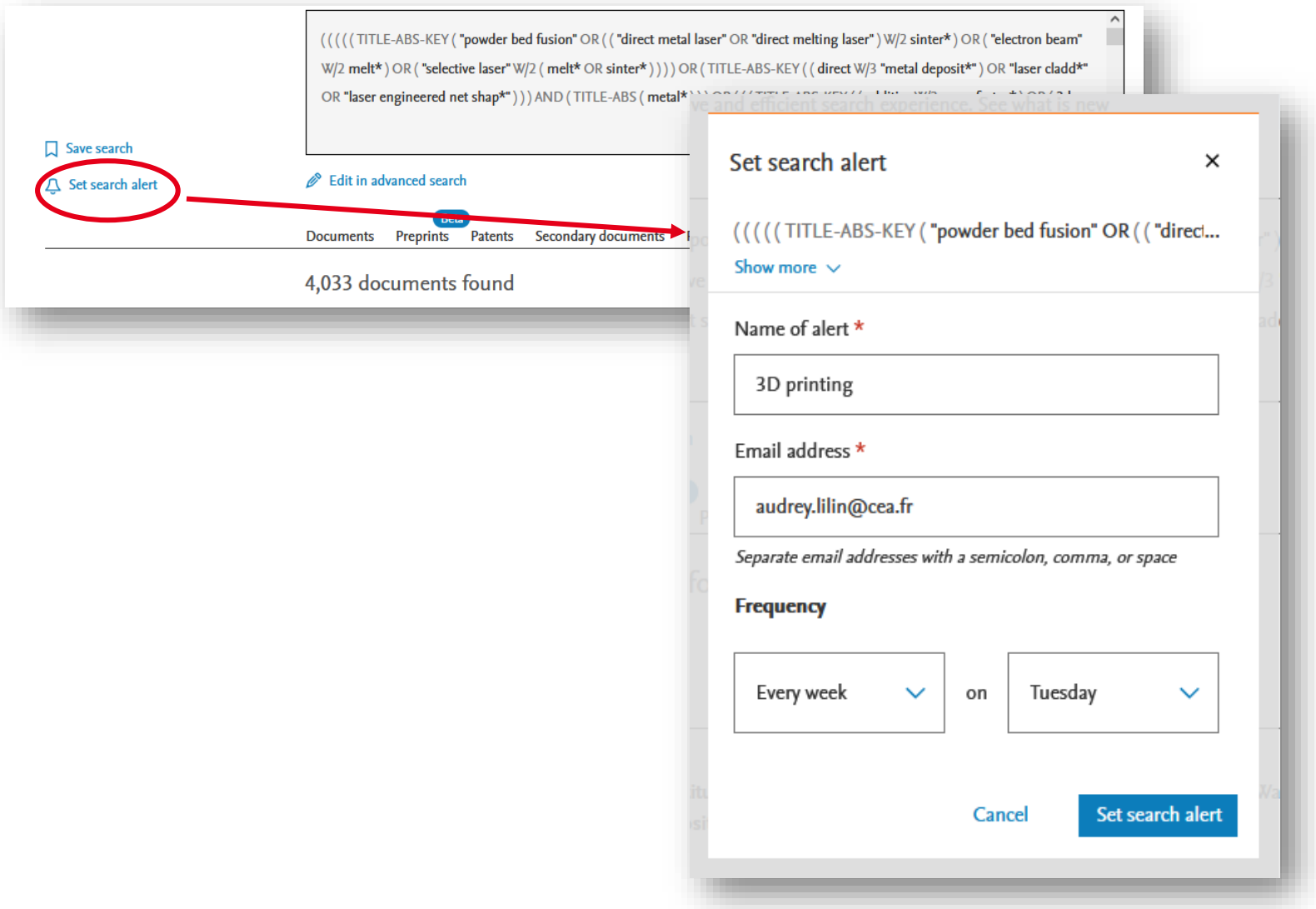
Alerts to update the results

Scopus

→ **Set search alert**

Available from results page and search history

From results:



CAUTION

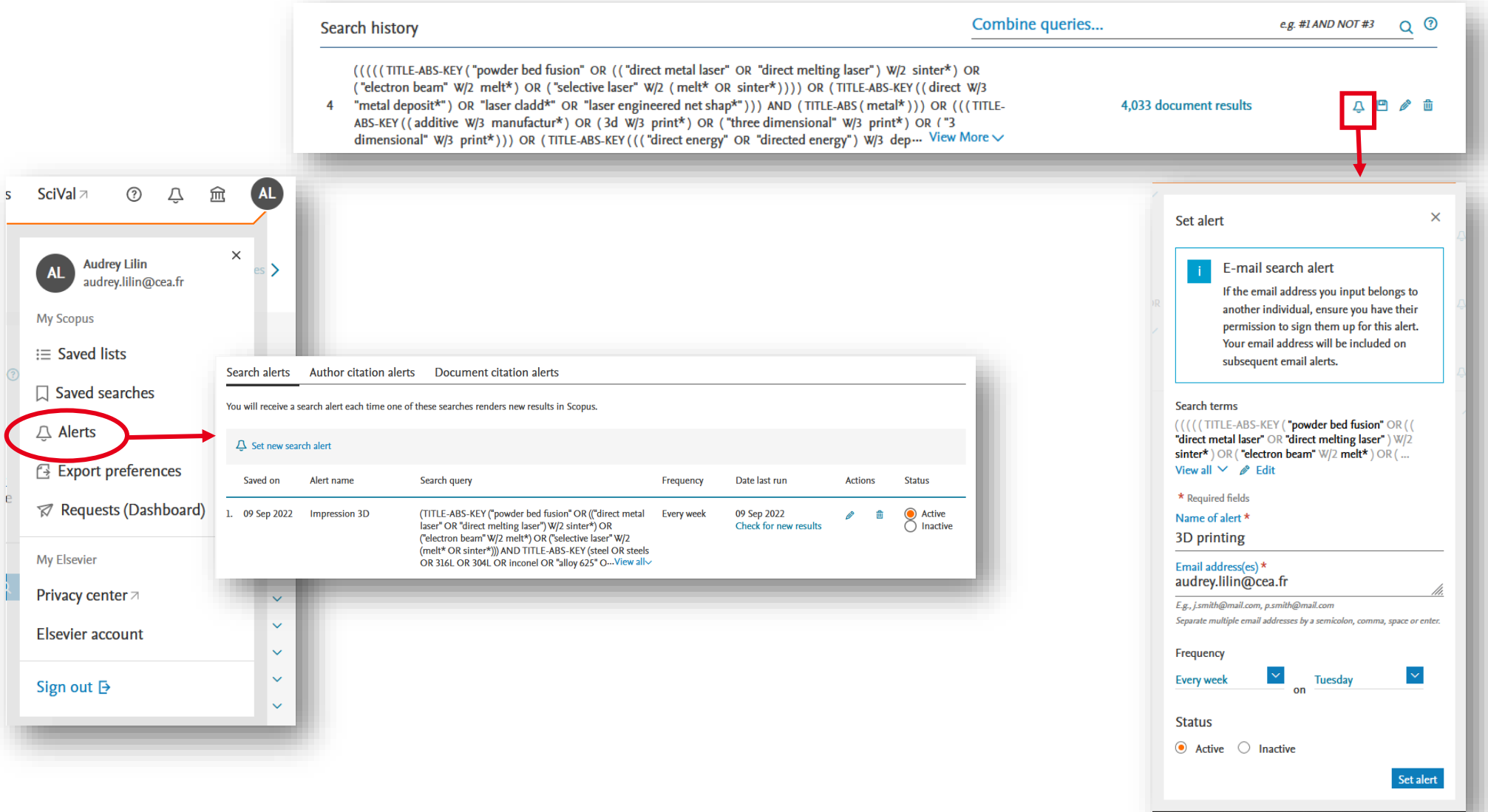
Do not mention a date in the alert, nor a specific time period

Alerts to update the results

Scopus

→ Set search alert

From search history:

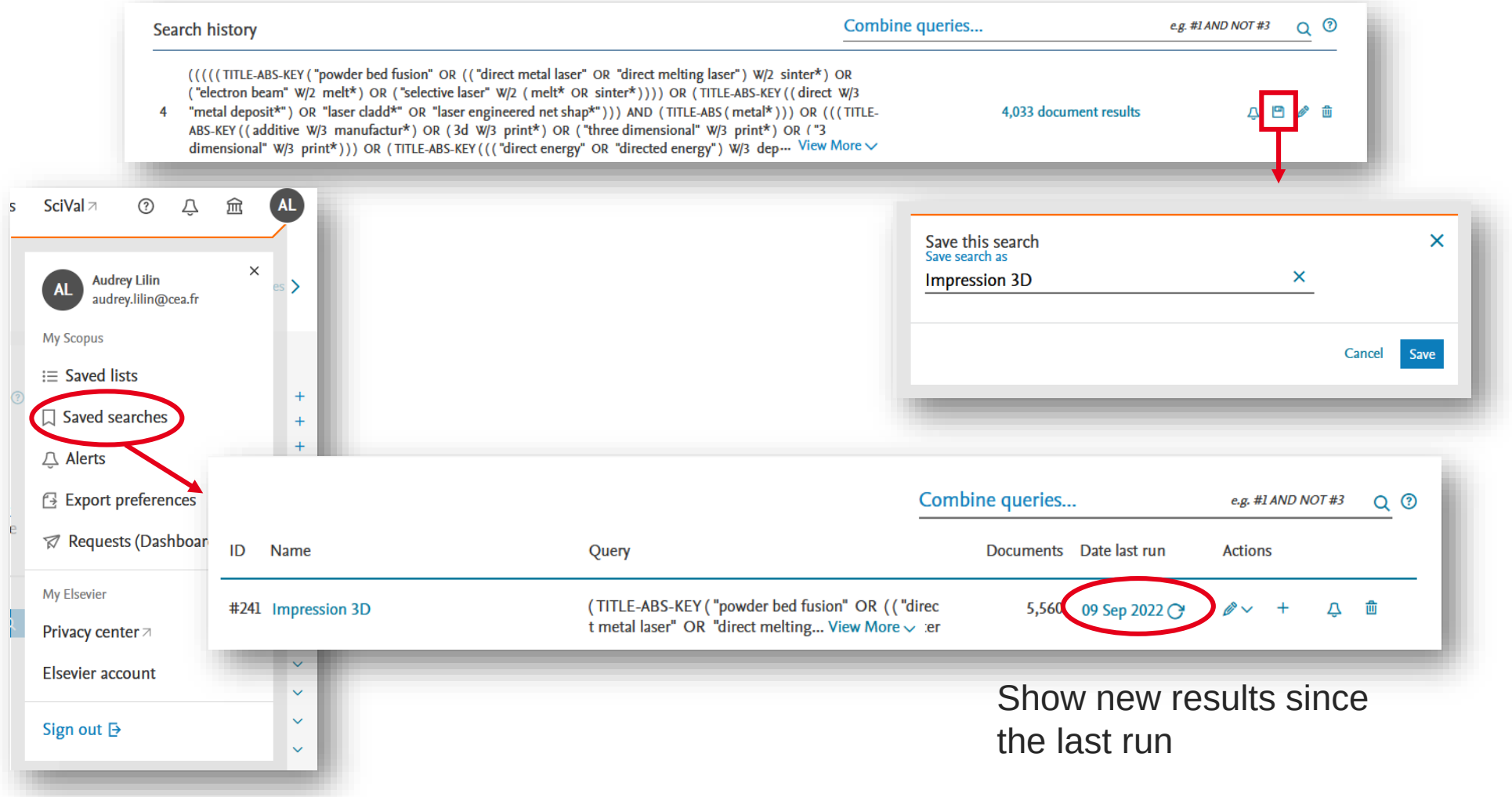


Follow-up on the latest additions

Scopus

→ Save and run a query

From search history:



Show new results since the last run

Exemple : searching ‘Additive manufacturing of stainless steel’

- **Concept 1** Additive manufacturing

TITLE-ABS-KEY(((3D OR “3 D” or “three D” OR “three dimensional”) PRE/1 print*) OR “additive manufactur*” OR (“powder bed fus*” OR “electron beam melt*” OR “selective laser melt*” OR “selective laser sinter*” OR “direct metal laser sinter*” OR “laser metal deposit*” OR “direct* energy deposit*” OR “extreme high speed laser clad*” OR “electron beam freeform fabricat*” OR “wire arc additive manufactur*”) OR (PBF OR EBM OR SLM OR SLS OR DMLS OR LMD OR DED OR EHLA OR EBF3 OR WAAM))

- **Concept 2** Stainless steel

TITLE-ABS-KEY((stainless W/2 steel) OR (SS316 OR SS316L OR 316L OR SS16N OR 316N OR SS304 OR SS304L OR 304L OR SS304N OR 304N))

Exercise : queries in Scopus

Concept 1 : reflectrometry :

#1 TITLE-ABS-KEY(reflectometr* OR TDR OR FDR OR ellipsomet*)

Concept 2 : cables :

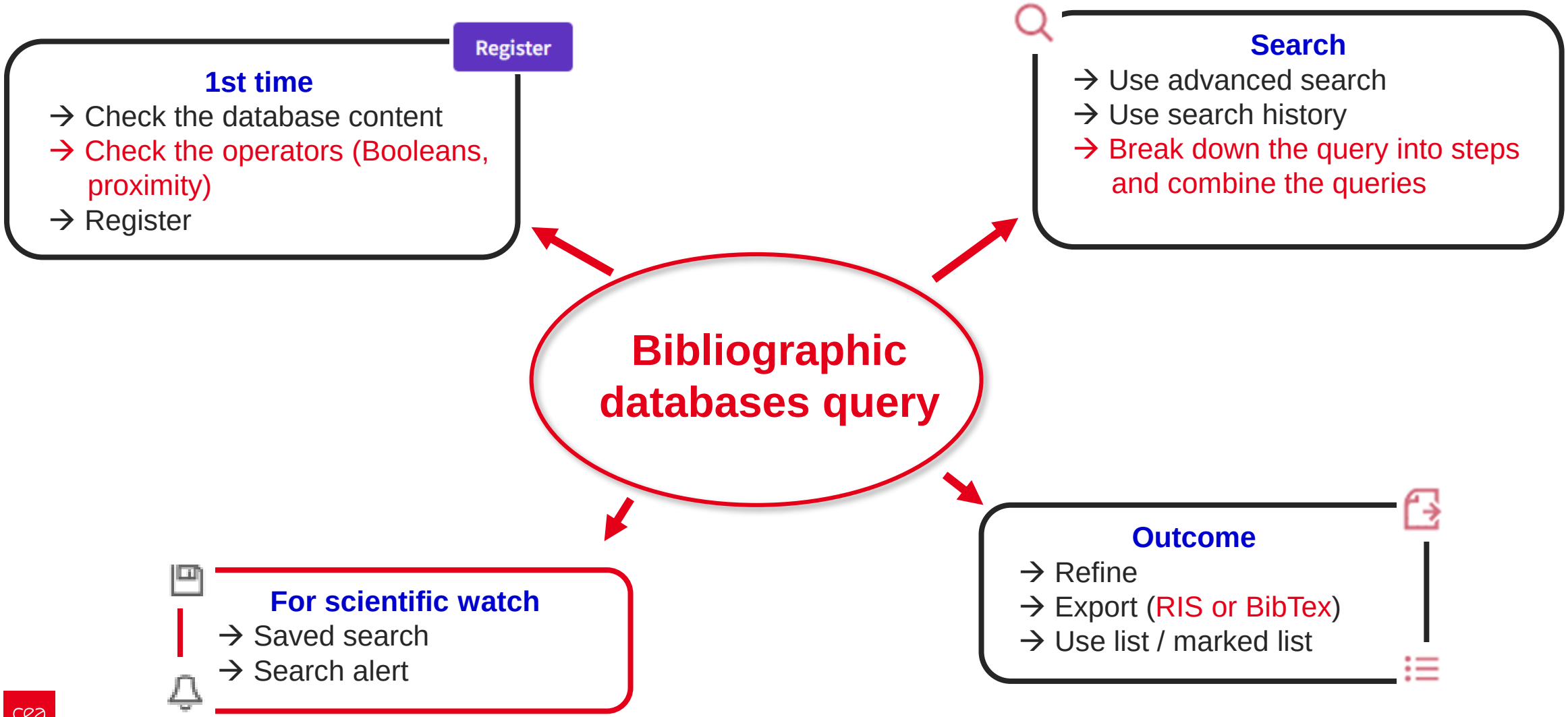
#2 TITLE-ABS-KEY(cable OR wire OR wiring OR line OR « twisted pair »)

Concept 3 : faults :

#3 TITLE-ABS-KEY(fault OR defect* OR « partial discharge » OR anomal* OR abnormal* OR aging OR aged)

#1 AND #2 AND #3

Search in a bibliographic database: summary



Zotero

Why use a reference tool ?

- To help you collect, manage and sort your references
- To keep your references consistent
- To make your life easier

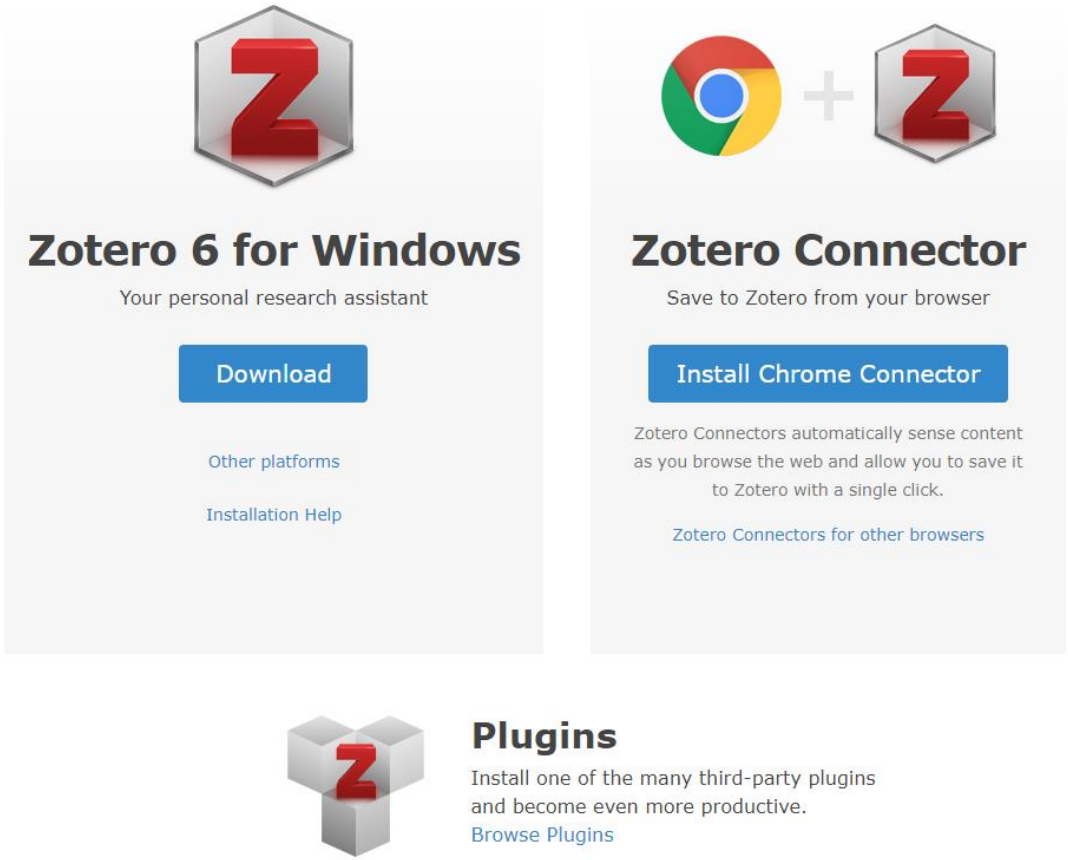
Zotero

Zotero is a free, easy to use reference management software that enables users to collect, organize and use their references in their academic writings.

It is an open-source platform which works on both Macs and PCs.

Installation :

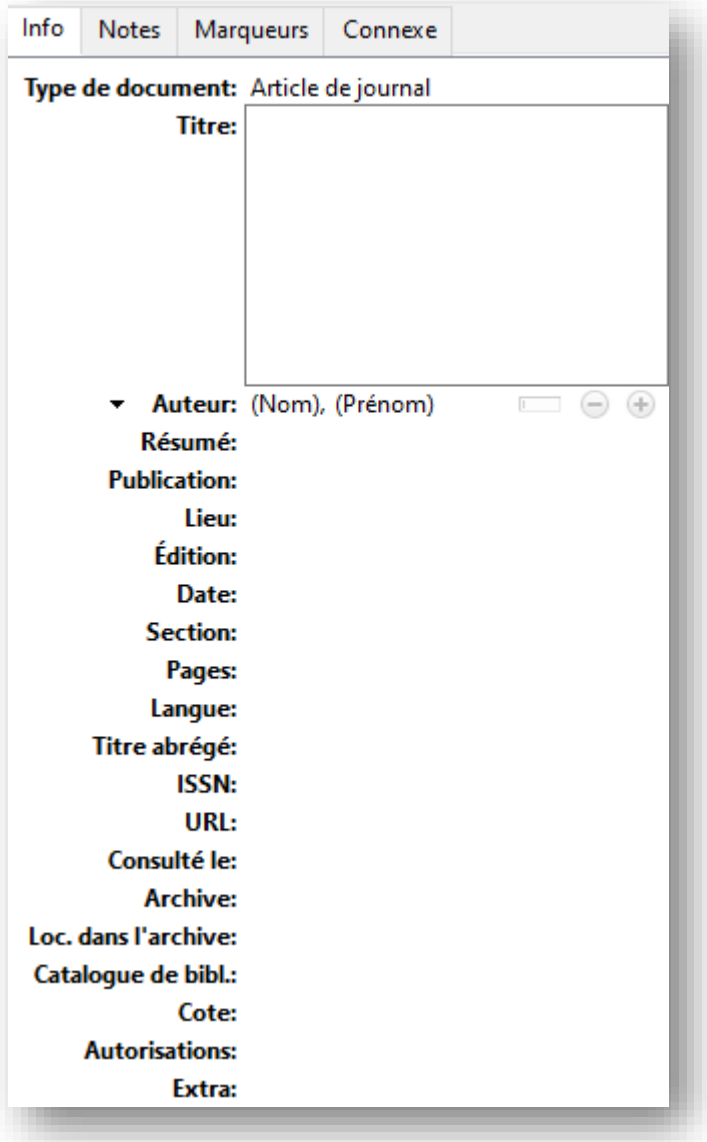
You can download Zotero on the Zotero download page. Be sure to also install the Zotero Connector for your browser.



Online support:
https://www.zotero.org/support/start

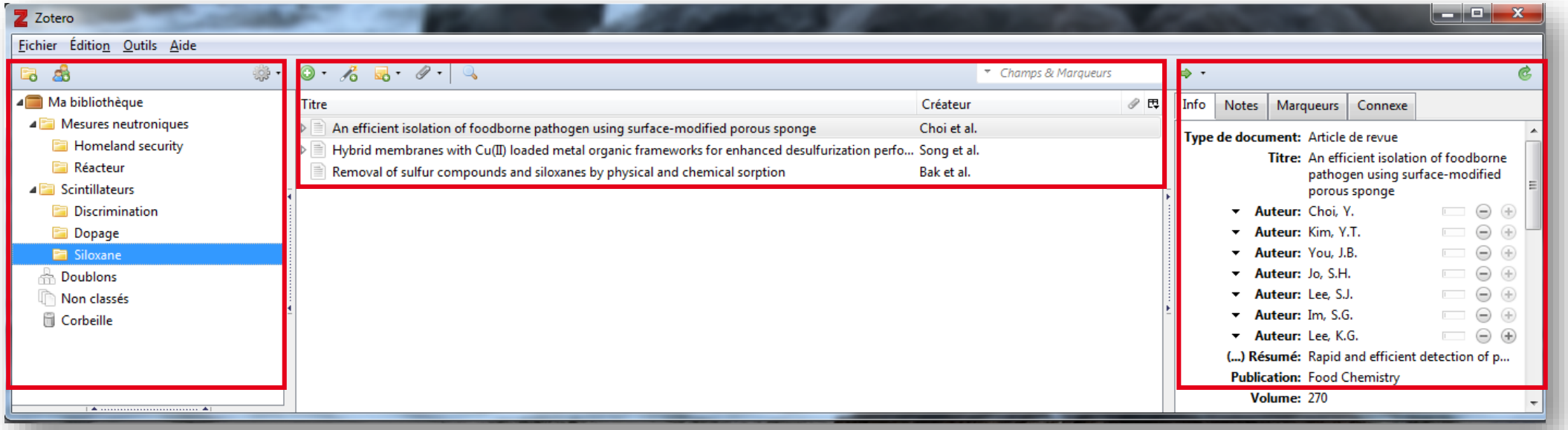
How does Zotero work ?

- Zotero collects ‘metadata’
- This includes: title, author name, date of publication etc.
- This can be automatically collected by Zotero, or manually added



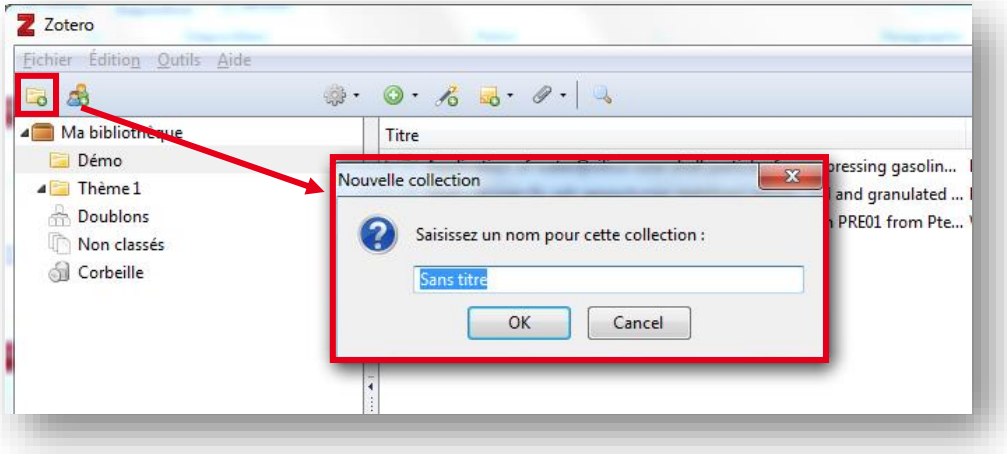
Zotero dashboard

Left pane	Center pane	Right pane
« My library », which contains all the items Collections and subcollections	The list of all the items available in the selected collection	Metadata of the selected items

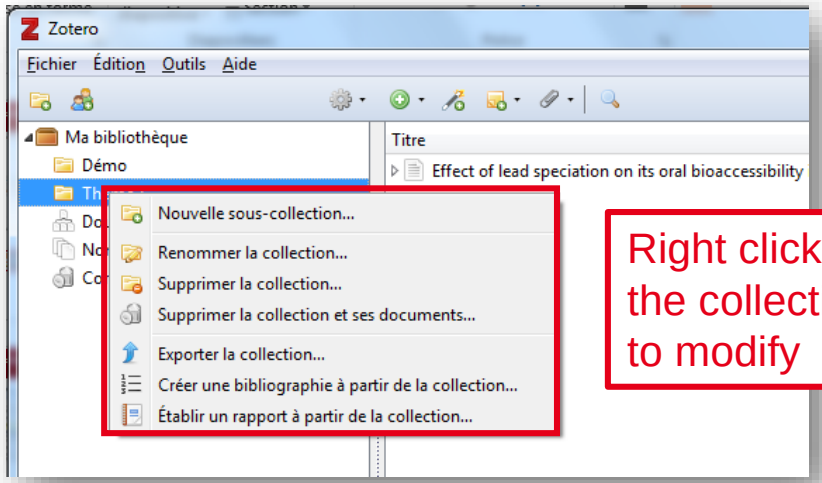


Collections

Create new collections



Create subcollections, rename or delete collections



Right click on the collection to modify

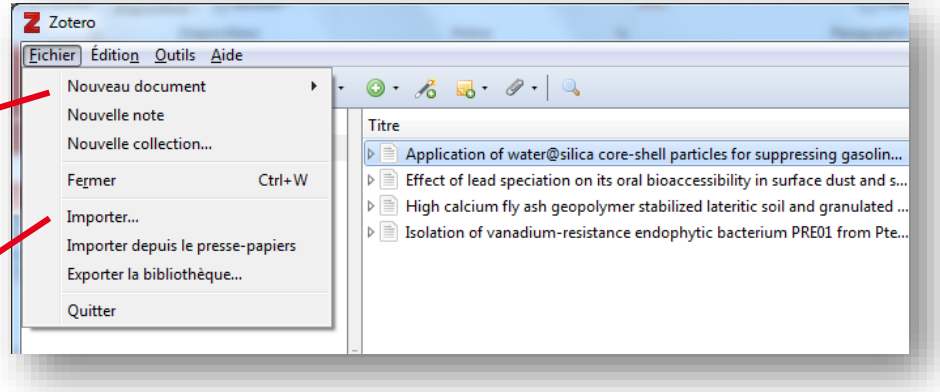
Items that are not in any collection can be found in the “Unfiled Items” special collection at the bottom of the collections list in the left Zotero pane.

Deleting a collection **does not delete** the items in the collection. Items are still accessible by clicking on “My Library” or the “Group library” name.

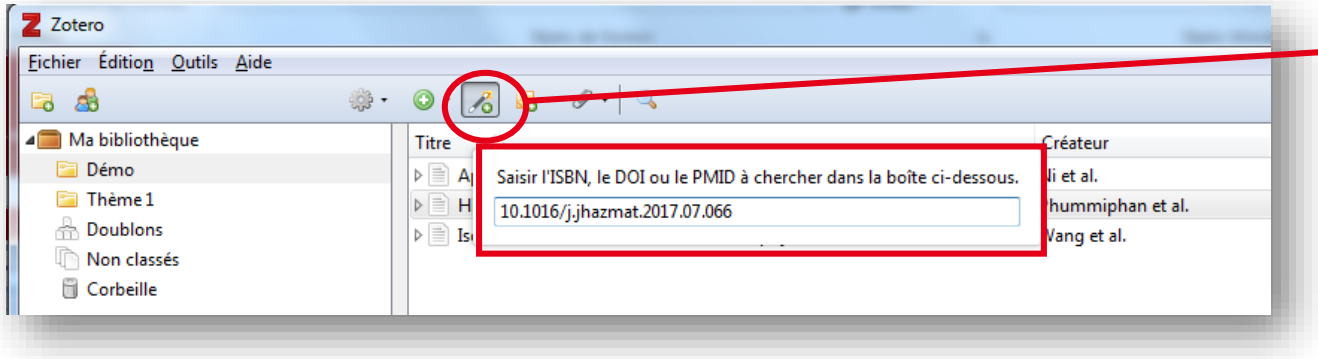
Adding items to collections

Add items manually

Large-scale imports from databases



Add item by identifier



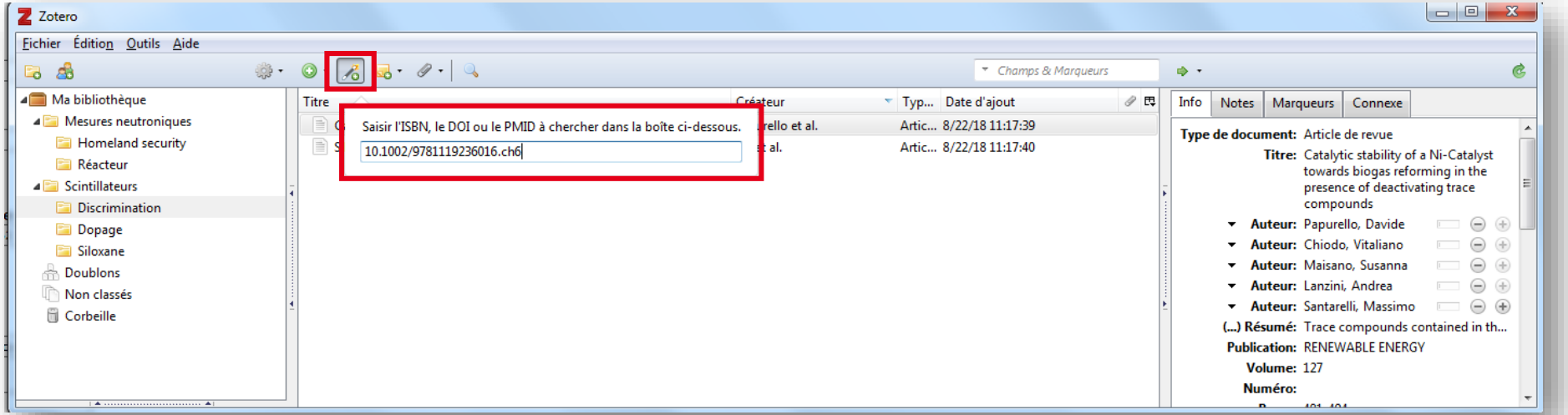
Adding items using Zotero Connector

- When Zotero recognizes that an article/book is open in your browser the Z icon ( ) is replaced by a save icon which will be a book, article, image, or other single item (e,g.    )
- Clicking on it will add the item to the current collection in Zotero
- If the save icon is a folder (), the webpage contains multiple items. Clicking it will open a dialog box from which items can be selected and saved to Zotero

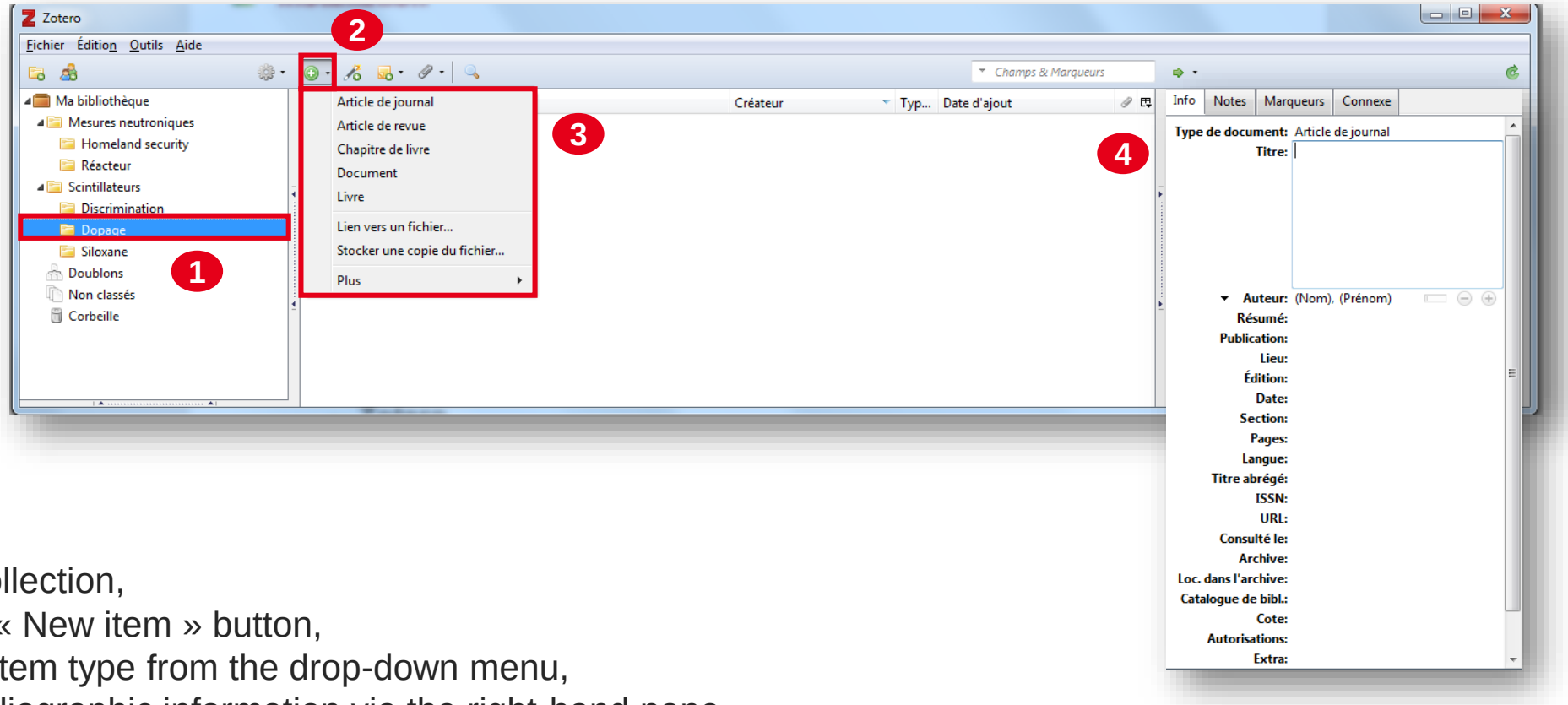
Adding item by identifier

You can quickly add all the details about an item by using the ISBN, DOI, PubMed ID, arXiv ID or ADS Bibcode

This is done by clicking the Add Item by Identifier button (a magic wand symbol) in the Zotero toolbar, typing in the ID number and pressing enter.



Adding item manually



Add item **manually** by:

1- Selecting the target collection,
2- Clicking on the green « New item » button,
3- Selecting the desired item type from the drop-down menu,
4- Entering the item's bibliographic information via the right-hand pane

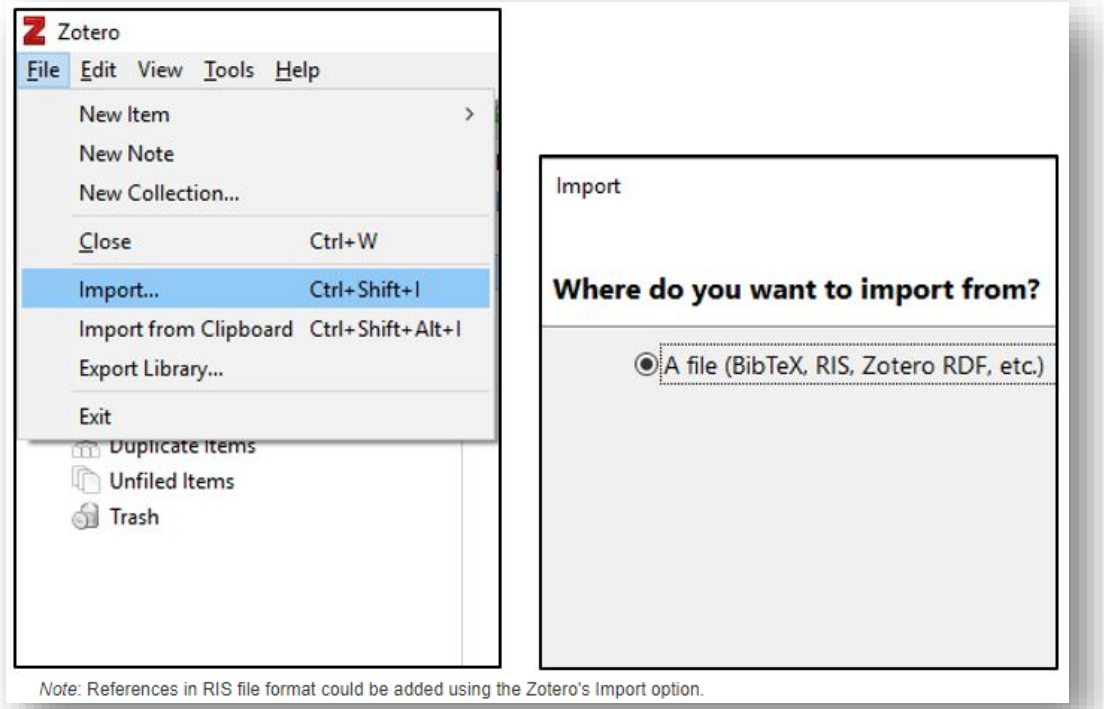
Adding items from WoS or Scopus

You can add or import references from WoS or Scopus in two ways:

1. Using the Zotero Connector: the easiest and most common approach
3. Importing BibTeX or RIS file

Importing BibTeX or RIS file :

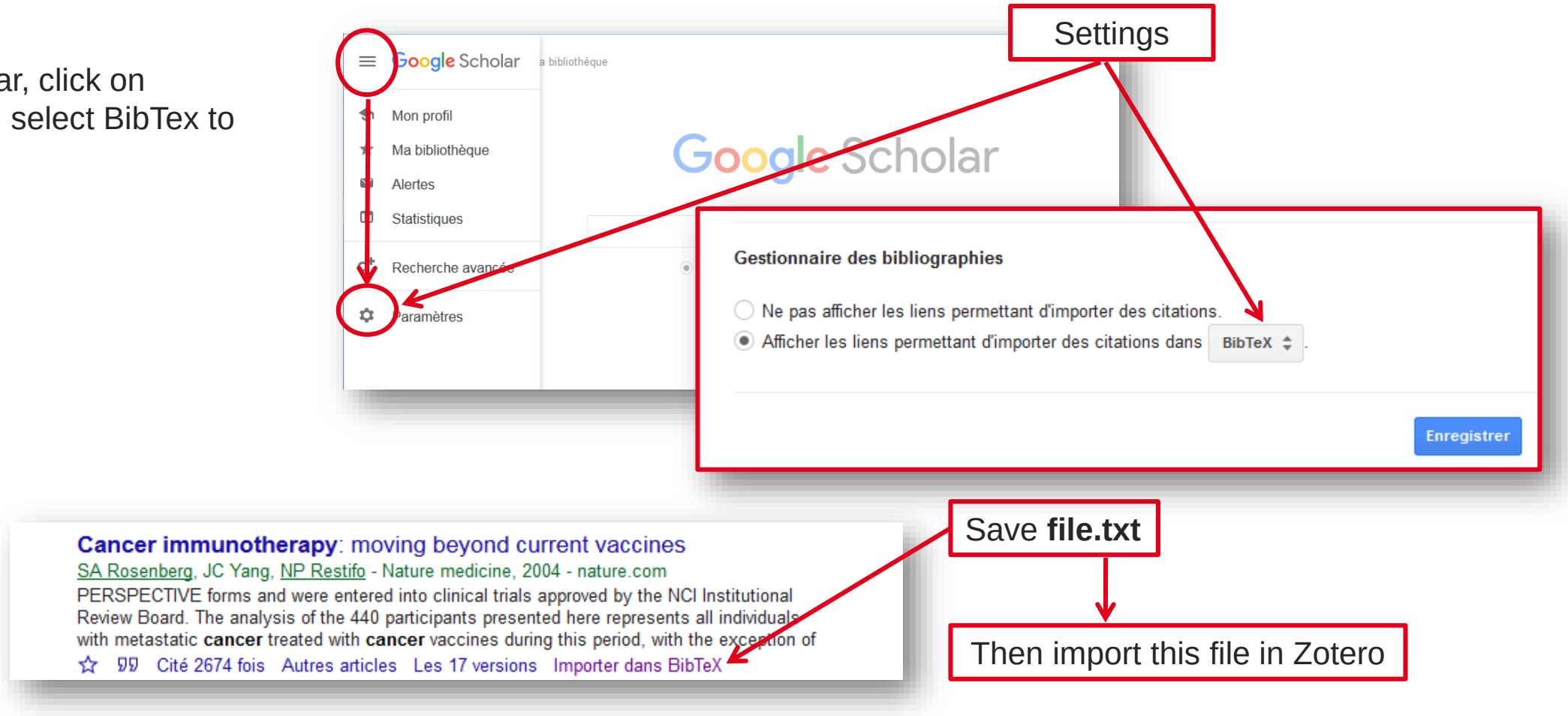
1. Select records on the « results page » of WoS or Scopus, then export them in BibTeX (file.bib) or RIS (file.ris) format
2. Import this file into Zotero



Note: References in RIS file format could be added using the Zotero's Import option.

Adding items from Google Scholar

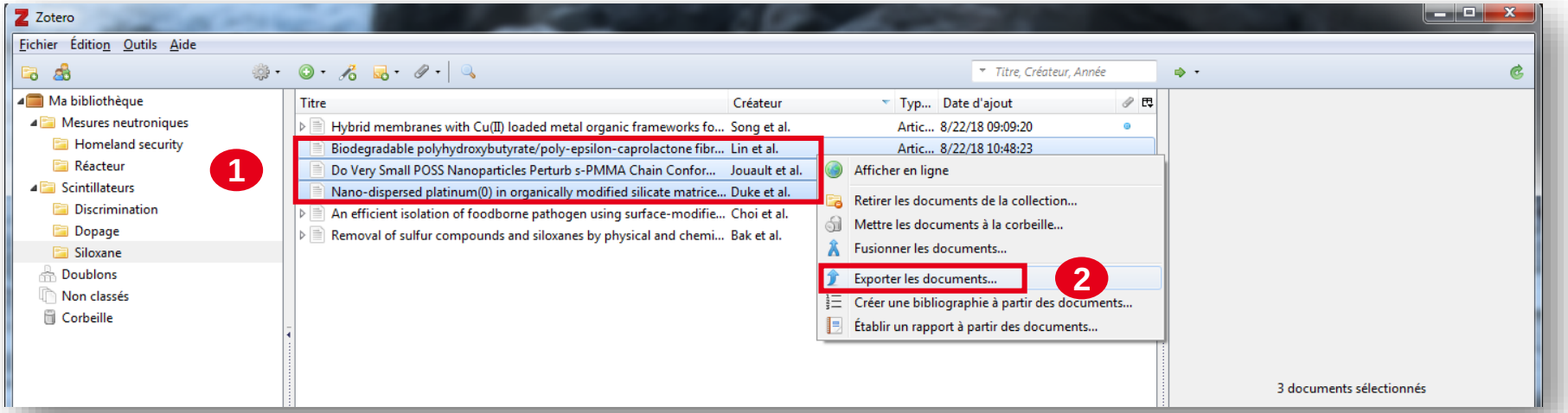
In Google Scholar, click on « settings », and select BibTex to display links



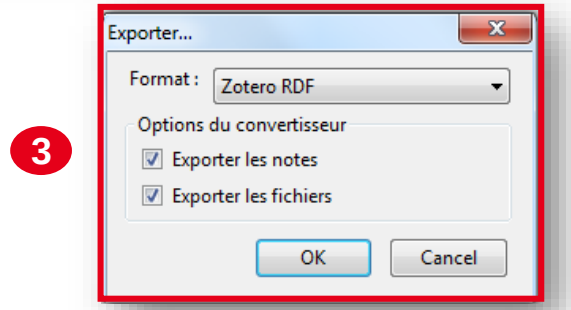
Sharing items

To export items :

1- Select items
2- Right click and select « Export items… »
3- When sharing items with another Zotero user, select Zotero RDF with files and notes for the most complete transfer



To import items :

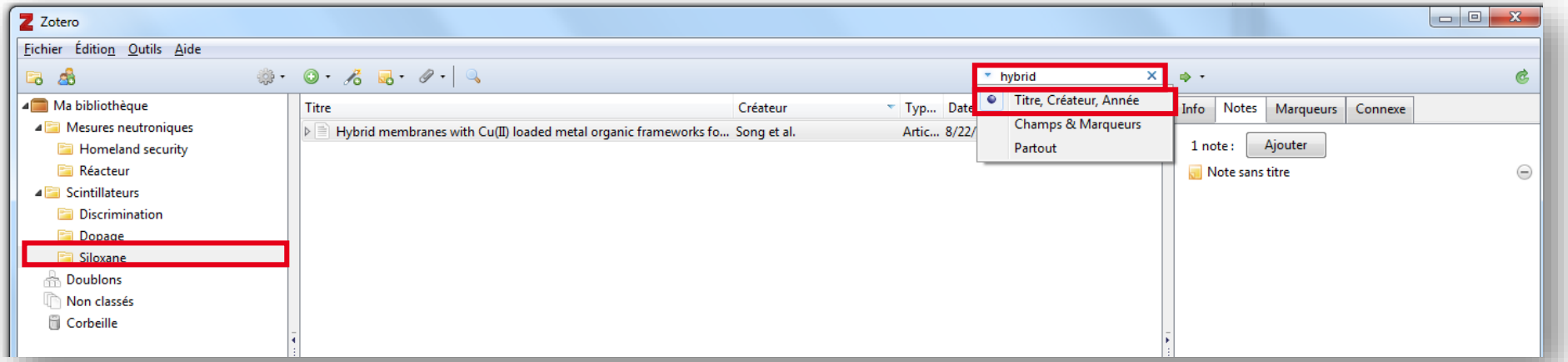


Zotero can import bibliographic data stored in a variety of standardized formats used by databases and other reference management tools. The most popular formats are RIS, Bib(La)Tex, and MODS.
If you have a database stored in one of these formats, such as a BibTeX database you've compiled or a RIS database you've exported from another reference manager, you can import them into Zotero by clicking File → “Import…” and choosing “A file”.

Search items

Quick search

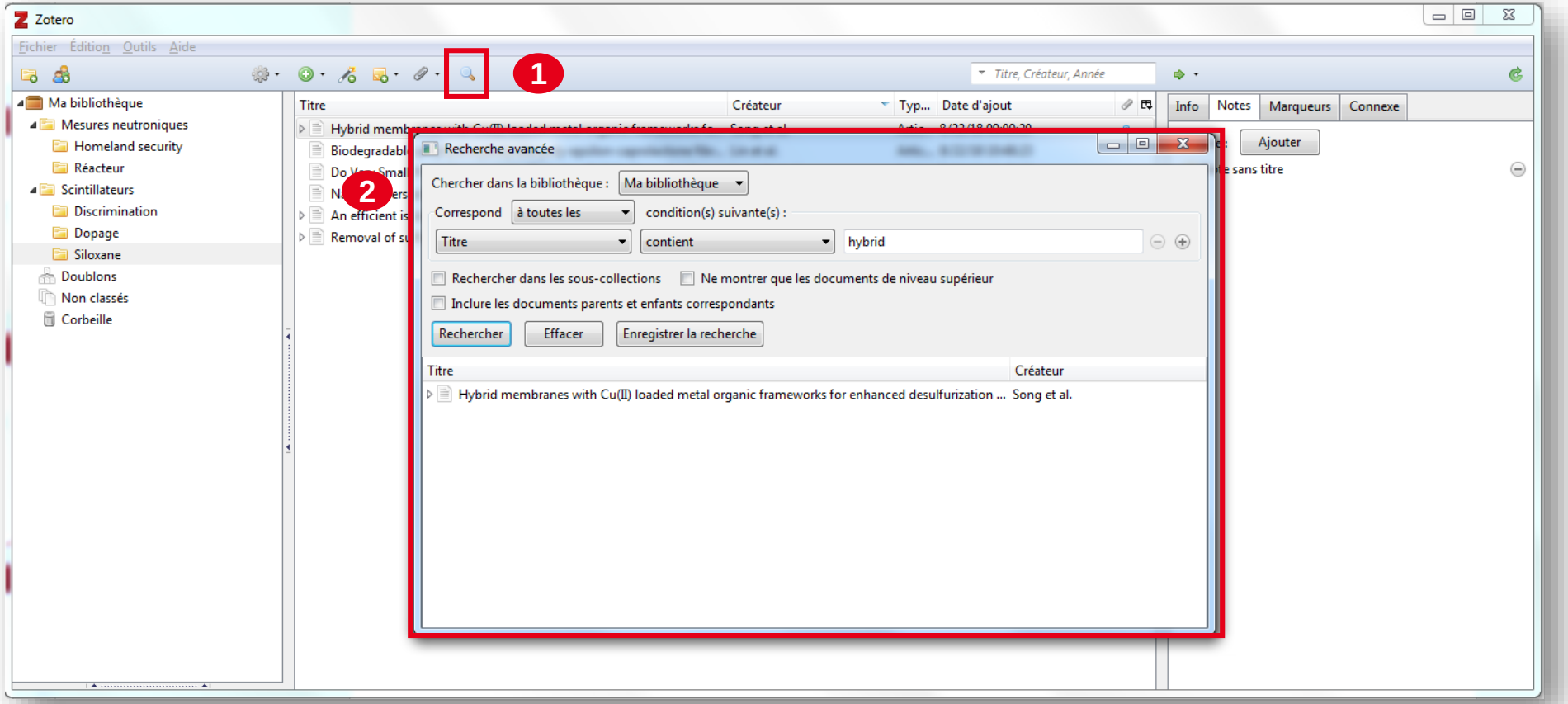
To begin the search, click inside the search box at the top-right of the center pane and start typing your search terms. As you type, only the items in the center column that match the search terms will remain.



Search items

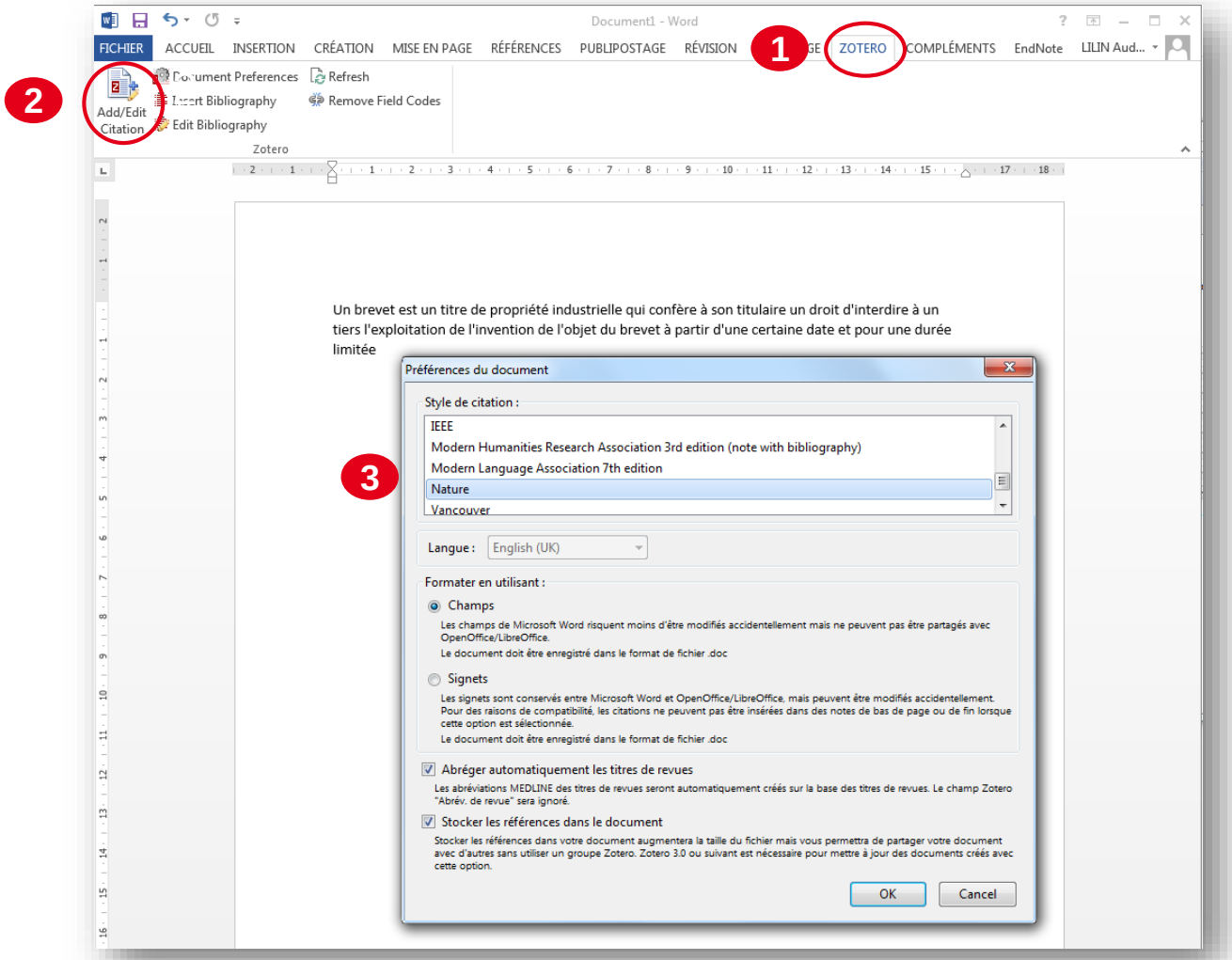
Advanced search

To open the Advanced Search window, click on the magnifying glass icon ( ) at the top of the center pane.
In this window, you can filter items by the content of specific fields or by other properties, like item type or the collection an item belongs to. Multiple filters can be set up by clicking the plus button.

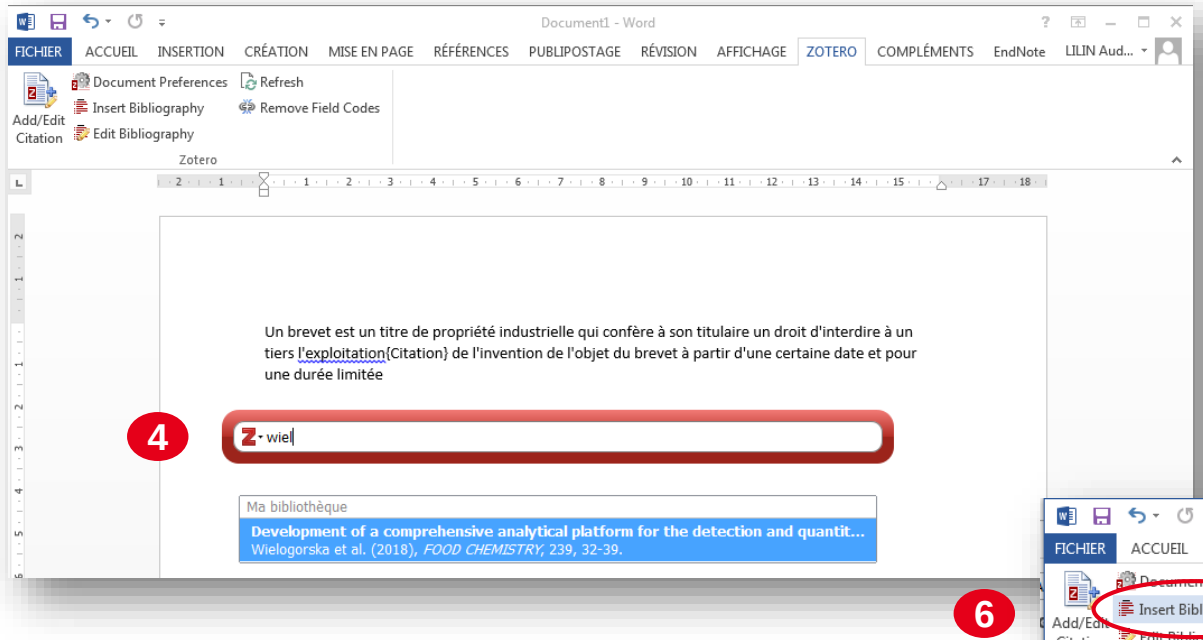


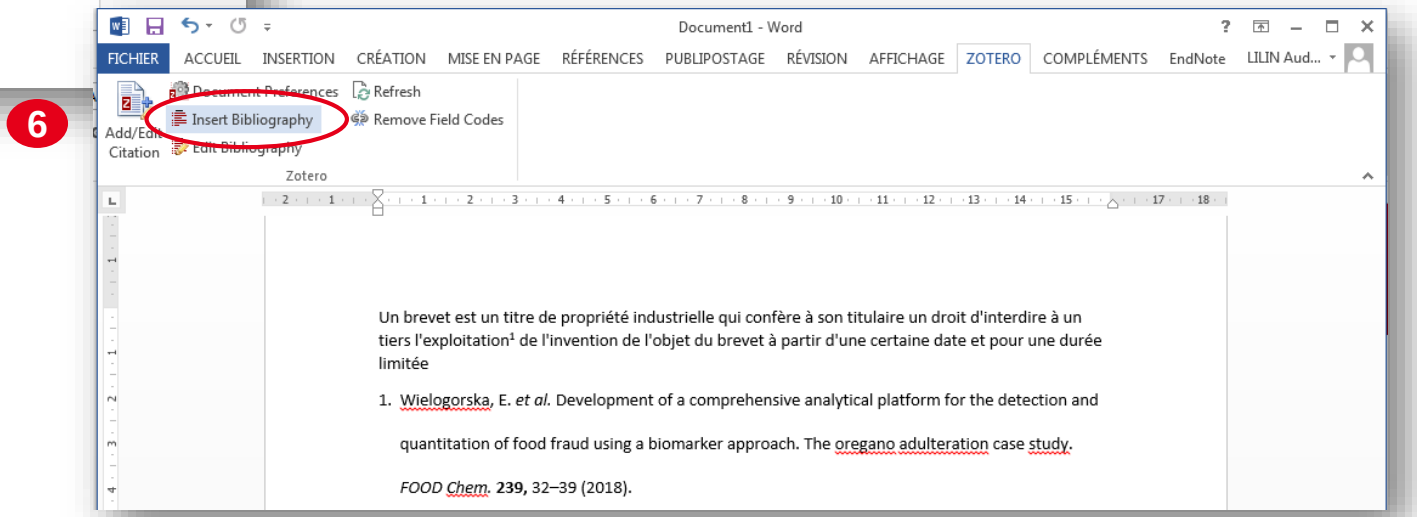
Using the Zotero Word plugin

1- Zotero tab,
2- At the cursor location, click “Add/Edit Citation”
3- Choose citation style
4- Search items in library
5- Add new quotations if necessary
6- Edit the bibliography



Using the Zotero Word plugin





Zotero tab

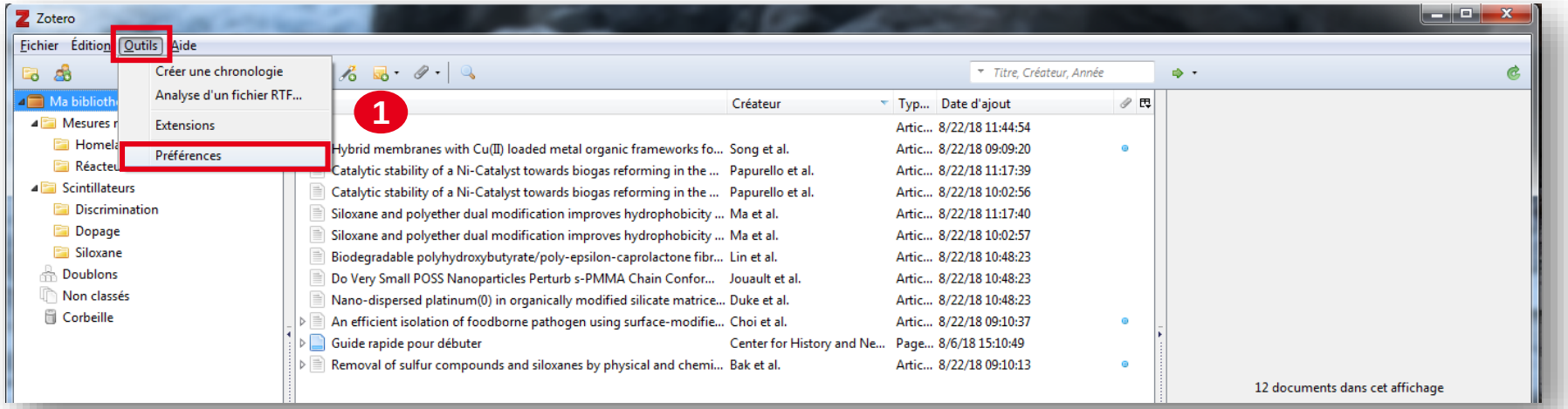
The Zotero tab contains these icons:

Add/Edit Citation		Add a new citation or edit an existing citation in your document at the cursor location.
Add/Edit Bibliography		Insert a bibliography at the cursor location or edit an existing bibliography.
Document Preferences		Open the Document Preferences window, e.g. to change the citation style.
Refresh		Refresh all citations and the bibliography, updating any item metadata that has changed in your Zotero library.
Unlink Citations		Unlink Zotero citations in the document by removing the field codes. This prevents any further automatic updates of the citations and bibliographies. Note that removing field codes is **irreversible**, and should usually only be done in a final copy of your document.

Source : https://www.zotero.org/support/word_processor_plugin_usage

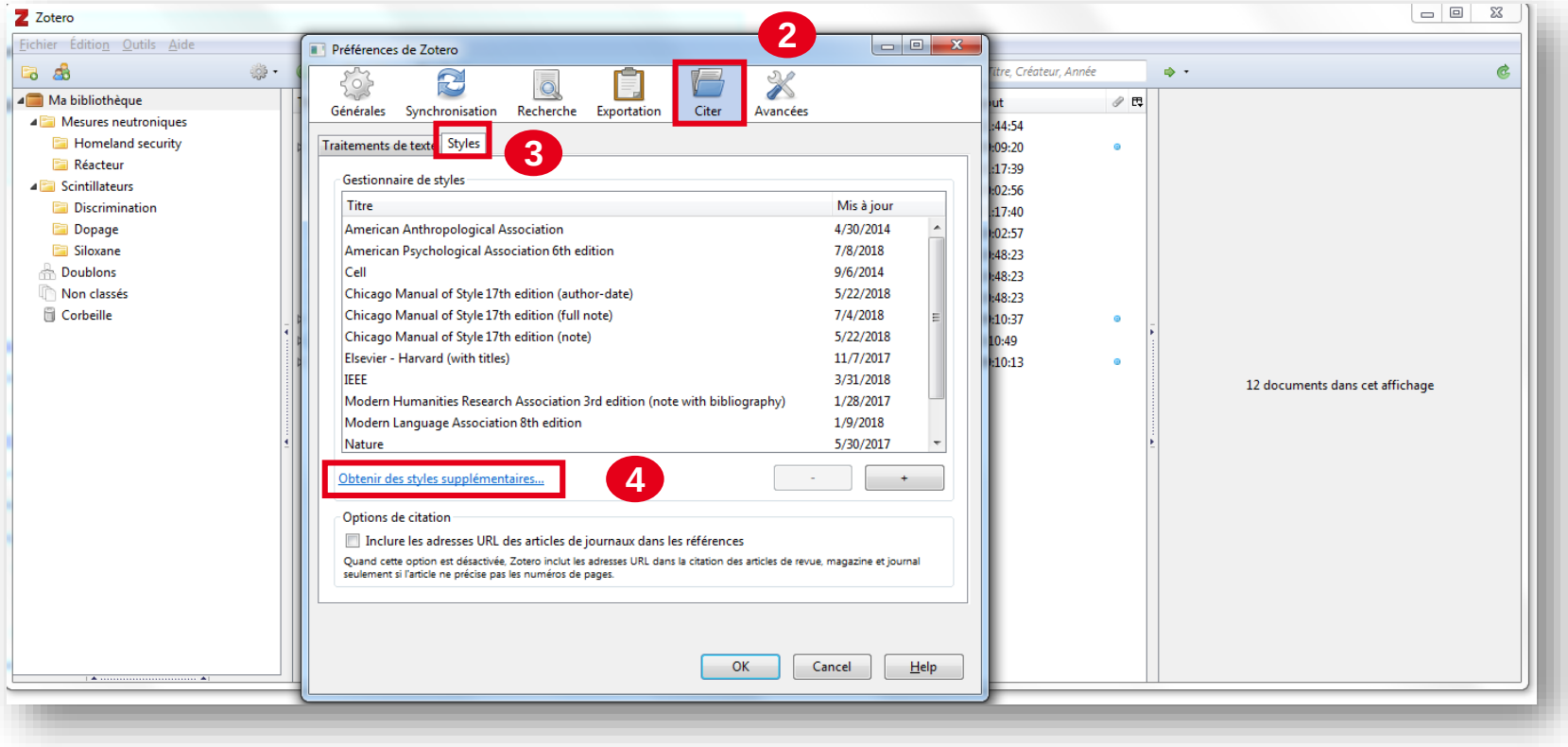
Installing additional styles

1- Tools > Preferences



Installing additional styles

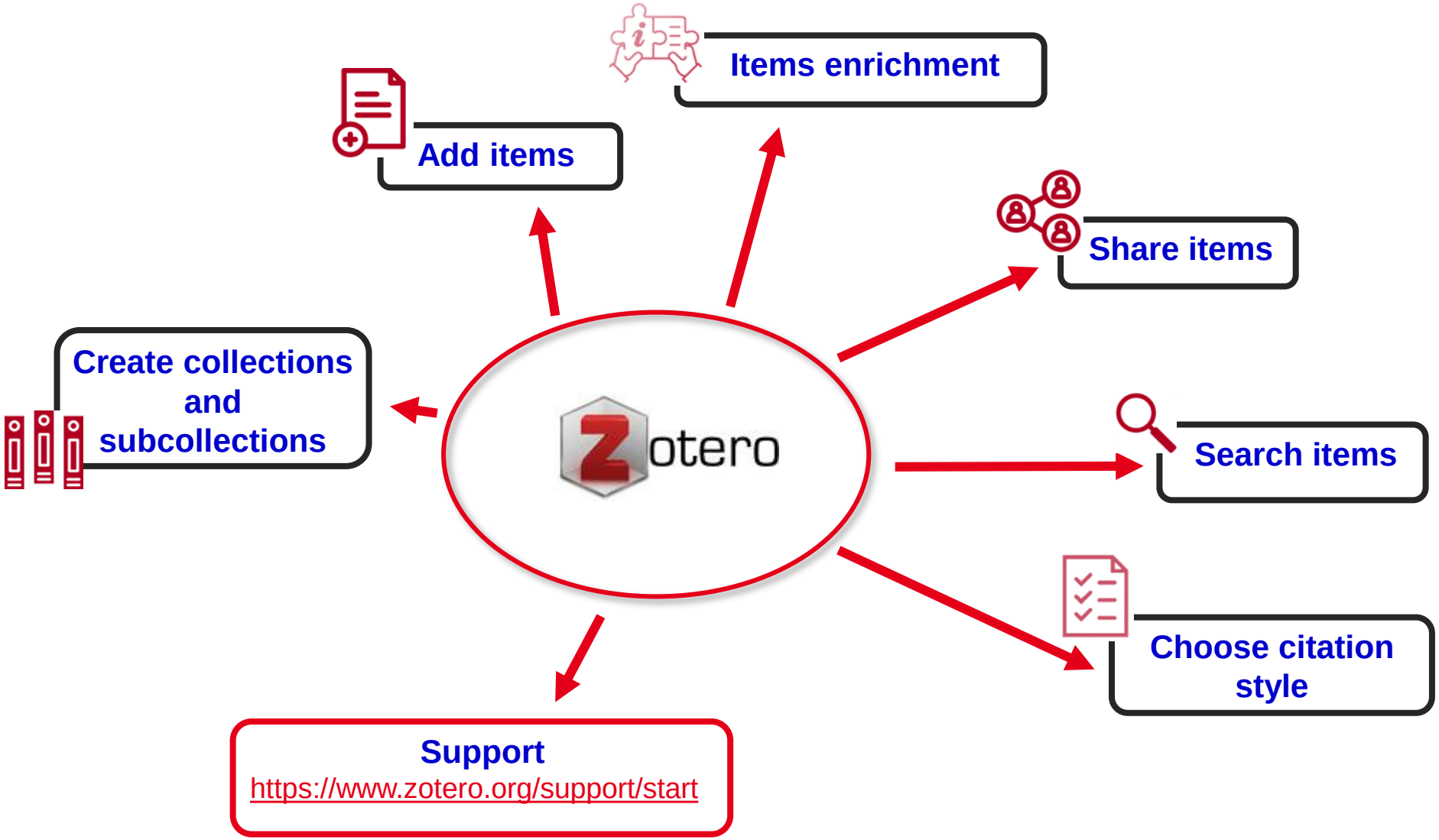
2- Cite pane
3- Styles tab
4- Click on the “Get additional styles…” option

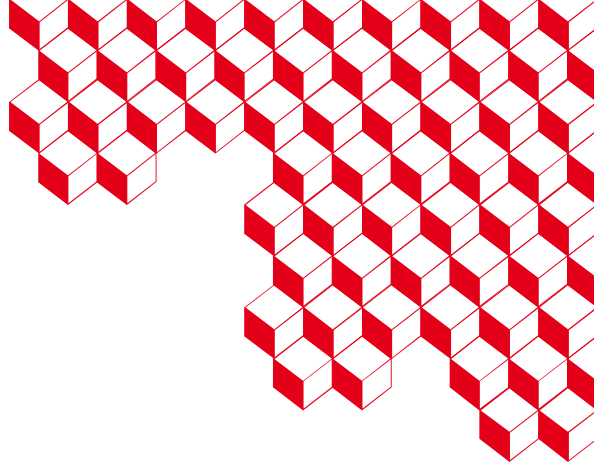


Installing additional styles

5- Search for the style
6- Select the style title to install in Zotero

Summary


Items enrichment
Add items
Share items
Create collections and subcollections
Zotero
Search items
Choose citation style
Support
https://www.zotero.org/support/start



Thank you

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