Postgraduate Journey: Research Tools for Postgraduate Students

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Graduate Research Journey

- Focus on Clarity. What are the problems? Research Questions?
- Read the literatures for finding solutions. Identify the variables/parameters & gaps
- SMART research objectives.
- Clear methodology in achieving the research objectives
- Make observations through experiments and analyse collected data (validate the data)
- Discuss any trends/ conflict with supporting facts
- Make a sound conclusion (answering the objectives)

SCIENTIFIC RESEARCH SKILLS

Research Presentation

Results, Discussion. Conclusion

Research Methodologies: appropriate to specific objective. Control and blank? Flaws in experimental design and statistical data analysis

Literature review: abstracting & paraphrasing, citations & bibliographies, correct referencing

Problem formulation, research design, **objective and scope**

Identification of proposed **research topic**, research questions, methodology and hypotheses.

1. A Good Research Topic/Title

Rethink and understand your research topic…

- THE EFFECTS ON THE PERCENTAGE OF ACTIVE COMPONENTS IN DETERGENTS
- THE EFFECTS ON THE PERCENTAGE OF ACTIVE COMPONENTS IN MULTI ACTIVE DETERGENTS
- STATISTICAL STUDY OF THE EFFECTS ON THE PERCENTAGE OF ACTIVE COMPONENTS IN MULTI ACTIVE DETERGENTS

- THE EFFECTS ON THE PERCENTAGE OF ACTIVE COMPONENTS ALKYL ETHOXY SULFATE (AES) AND ALKYL SULFATE (AS) IN MULTI ACTIVE POWDER DETERGENT

THE IMPORTANCE OF LITERATURE REVIEW

Seriously read a scientific paper

1. Identifying research question
2. Developing clear research objective
3. Choosing the right methods
4. Support scope of work/limitation of studies
5. Identifying gaps
6. Avoid duplication
7. Creating hypotheses and benchmark
8. Supporting result and discussion
9. Assist in explain
10. Propose recommendations
11. Examiners guide

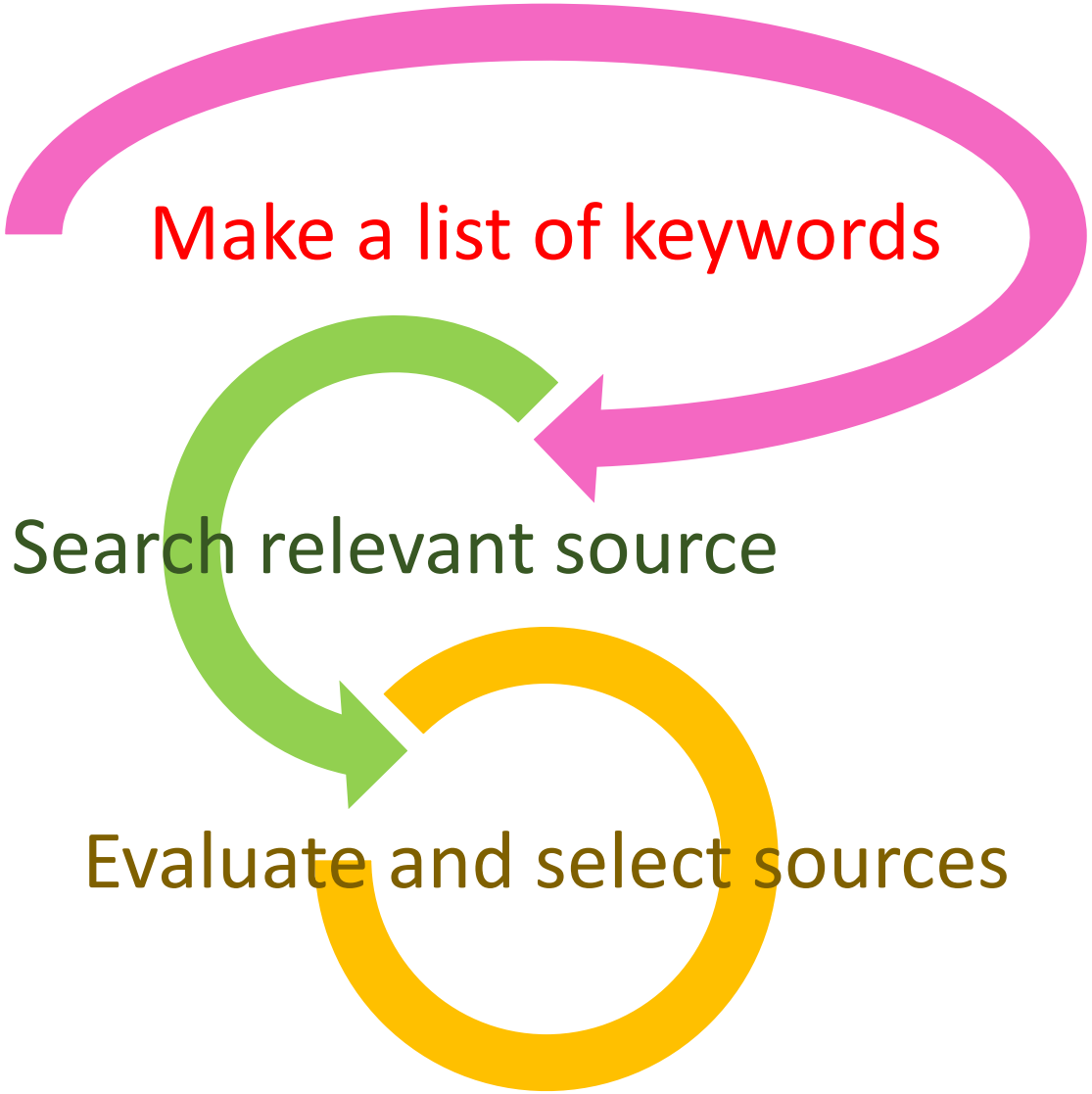
Literature Review is a continuous process

1. Identify and location of current (5 years) pertinent publication.
2. Summarizing and recording the contents of each publication.
3. Comparing and commenting on the merits and weakness of the various element, such as, theoretical perspective, definitions, research designs, methodology, instrumentation, data analysis, results, inferences, future recommendations

Reading the literature

- Must have sufficient basic knowledge on the research topic
- Strong background information
  - Supervisors
  - Experts
  - Seniors in same lab
  - Textbooks
  - Review articles

2. Search for relevant literature



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Make a list of keywords

Search
relevant
sources

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A microfluidic colorimetric biosensor for in-field detection of Salmonella in fresh-cut vegetables using thiolated polystyrene microspheres, hose-based microvalve and …

Y Man, M Ban, A Li, X Jin, Y Du, L Pan

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Research more, search less

Search any topic, author, journal, etc. or any combination of these

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Search strategy: Unnamed

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Teleconsultation for diabetes care — OR

Both concepts — AND

intitle: Telediabetes

Intervention — OR

telemedicine | telehealth | Internet based | telecare | web based | mobile phone | telemedical | videoconferencing | text messaging | e mail | telephone | cell Phone | pda | e health

Problem — OR

RESULTS | MESSAGES 1 | QUERY

PubMed results are displayed in a separate tab

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Double click anywhere to enter terms
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To change an operator (e.g. AND → OR), double click it
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Use ADJn to express proximity, e.g. A ADJ3 B
Use the context menu to:
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* disable or enable items
* Add field tags to items
For further tips and help, see the tutorial videos and the FAQ

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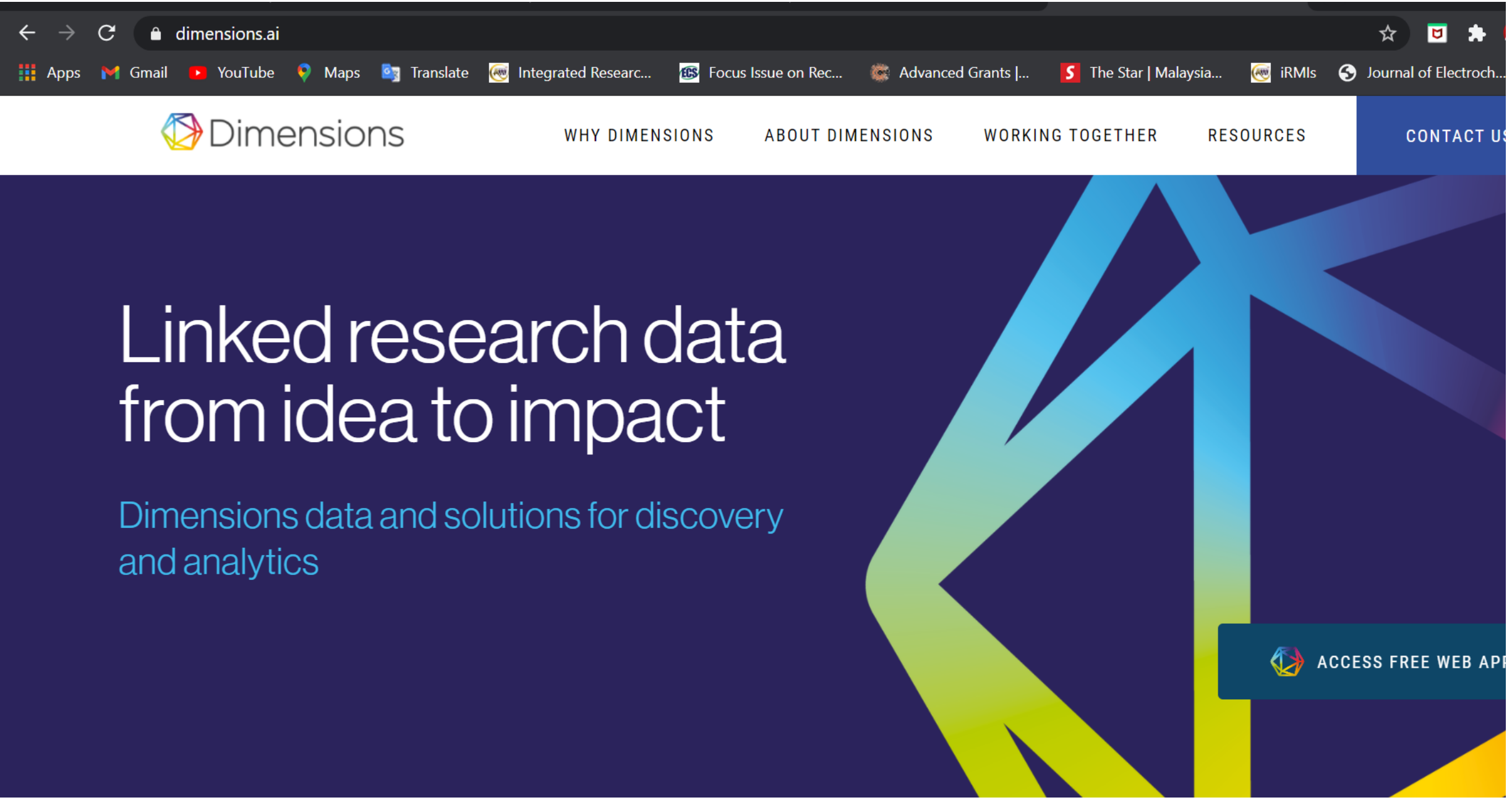
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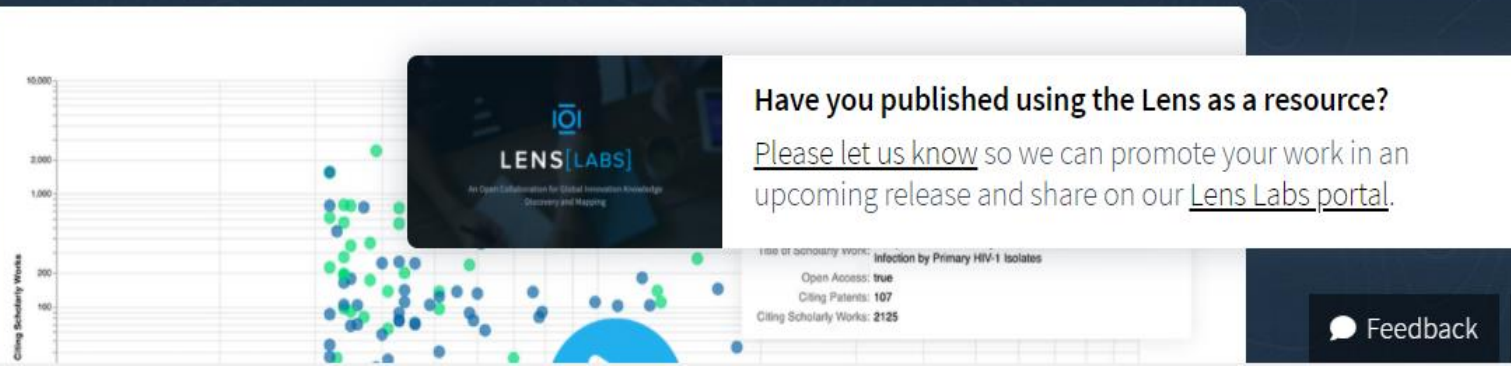

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[HTML] Recent advances in **biosensor** development for the detection of **cancer** biomarkers [HTML] sciencedirect.com

VSA Jayanthi, AB Das, U Saxena - Biosensors and Bioelectronics, 2017 - Elsevier

Cancer is the second largest disease throughout the world with an increasing mortality rate over the past few years. The patient's survival rate is uncertain due to the limitations of **cancer** diagnosis and therapy. Early diagnosis of **cancer** is decisive for its successful …

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Point-of-care **biosensor** systems for **cancer** diagnostics/prognostics

SA Soper, K Brown, A Ellington, B Frazier… - Biosensors and …, 2006 - Elsevier

With the growing number of fatalities resulting from the 100 or so **cancer**-related diseases, new enabling tools are required to provide extensive molecular profiles of patients to guide the clinician in making viable diagnosis and prognosis. Unfortunately with **cancer**-related …

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S Kumar, S Kumar, S Srivastava, BK Yadav… - Biosensors and …, 2015 - Elsevier

We report results of the studies relating to the fabrication of a paper based sensor comprising of poly (3, 4-ethylenedioxythiophene): poly (styrenesulfonate)(PEDOT: PSS) and reduced graphene oxide (RGO) composite. The effect of various solvents like methanol …

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Aptamer− nanoparticle strip **biosensor** for sensitive detection of **cancer** cells [HTML] acs.org

G Liu, X Mao, JA Phillips, H Xu, W Tan… - Analytical …, 2009 - ACS Publications

We report an aptamer− nanoparticle strip **biosensor** (ANSB) for the rapid, specific, sensitive,

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Time

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Multiplexed electrical detection of cancer markers with nanowire sensor arrays.

2,838 citations*

2005 NATURE BIOTECHNOLOGY

Gengfeng Zheng , Fernando Patolsky , Yi Cui , Wayne U Wang , Charles M Lieber

Harvard University

Biosensing Techniques **Biosensing Techniques** / methods

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We describe highly sensitive, label-free, multiplexed electrical detection of cancer markers using silicon-nanowire field-effect devices in which distinct nanowires and surface receptors are incorporated into arrays. Protein markers were routinely detected at femtomolar concentrations with high sele... View Full Abstract

cancer biosensing techniques ("biosensor")

Bioassay of prostate-specific antigen (PSA) using

1,299 citations*

Cancer

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Boolean Expressions for Search Engines

- Boolean expressions can be used with any search engine, not just Google. They enable very specific results. Below are some examples of Boolean expressions and how they can be used

Boolean operators to help narrow down your search

- **And** to find sources that contain more than one keywords (biosensor AND cancer)
- **Or** to find sources that contain one of a range of synonyms (biosensor OR sensor)
- **Not** to exclude results containing certain terms (Apple NOT fruit)

…..Boolean operators to help narrow down

- Quotation Marks “ “..whenever your keyword consists of more than a single word. AND means you are searching for documents that contain BOTH keywords (Starbucks, "latte macchiato".
- Parentheses ( ).. (children OR kids) AND nutrition. Notice that the OR links two synonyms. (elderly OR "older adults") AND (computers OR technology) You can use two or more sets of parentheses. ((teenager OR teen OR adolescent) AND media) NOT television.
- The asterisk *.. is a commonly used wildcard symbol that broadens a search by finding words that start with the same letters. Use it with distinctive word stems to retrieve variations of a term with less typing

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Chemical Engineering Journal, 3 March 2021, ...

Nguyen Ngan Giang, Hyun Jeong Won, … Sung Young Park

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Biosensor-based diagnostic approaches for various cellular biomarkers of breast cancer: A comprehensive review

Analytical Biochemistry, 17 October 2020, ...

Pushpesh Ranjan, Arpana Parihar, … Raju Khan

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Ultrasensitive electrochemical biosensor for detection of microRNA-155 as a breast cancer risk factor

Analytica Chimica Acta, 28 August 2020, ...

Fatemeh Hakimian, Hedayatollah Ghourchian

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Optical Fiber Technology, 22 January 2020, ...

Abinash Panda, Pukhrambam Puspa Devi

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Nanoengineered Biomaterials for Advanced Drug Delivery, 26 June 2020, ...

Mohsen Khodadadi Yazdi, Payam Zarrintaj, ... Mohammad Reza Saeb

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A DNA rolling motor for photoelectrochemical biosensing of oral cancer overexpressed 1

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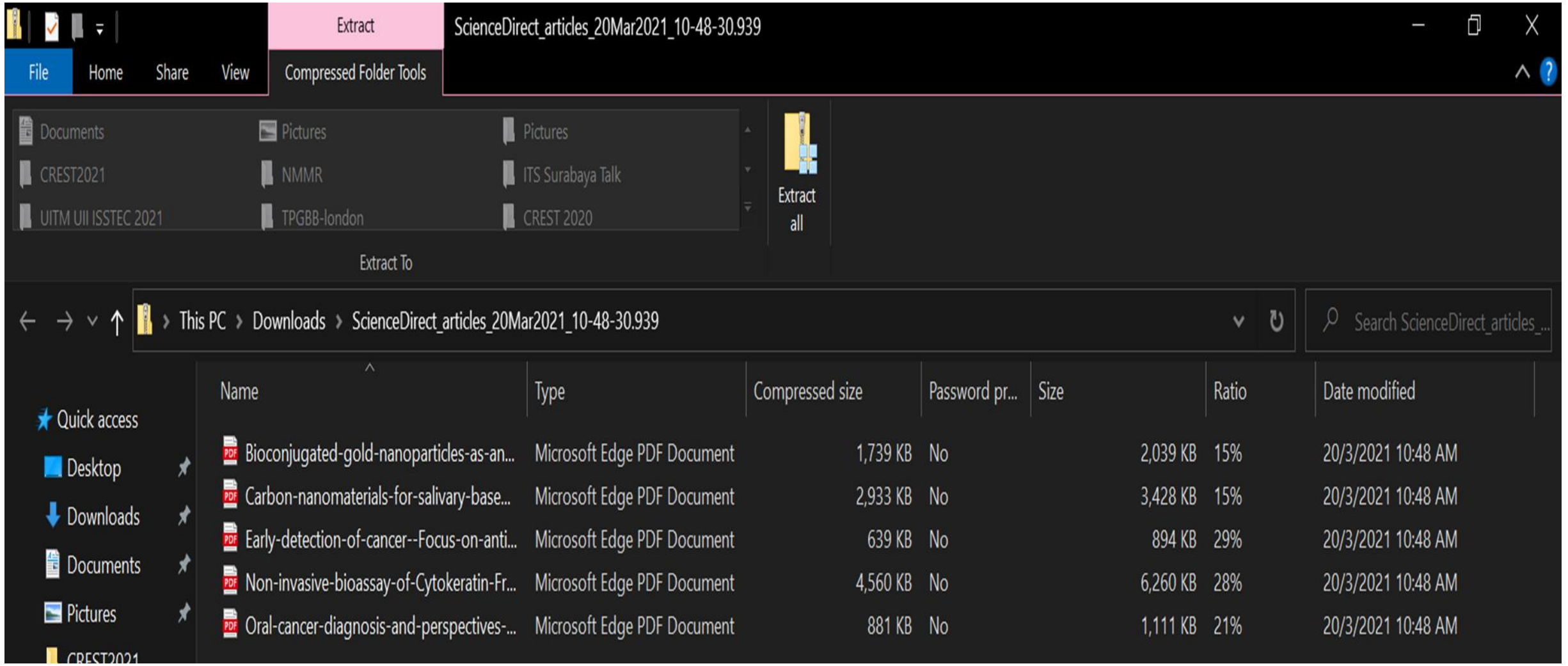

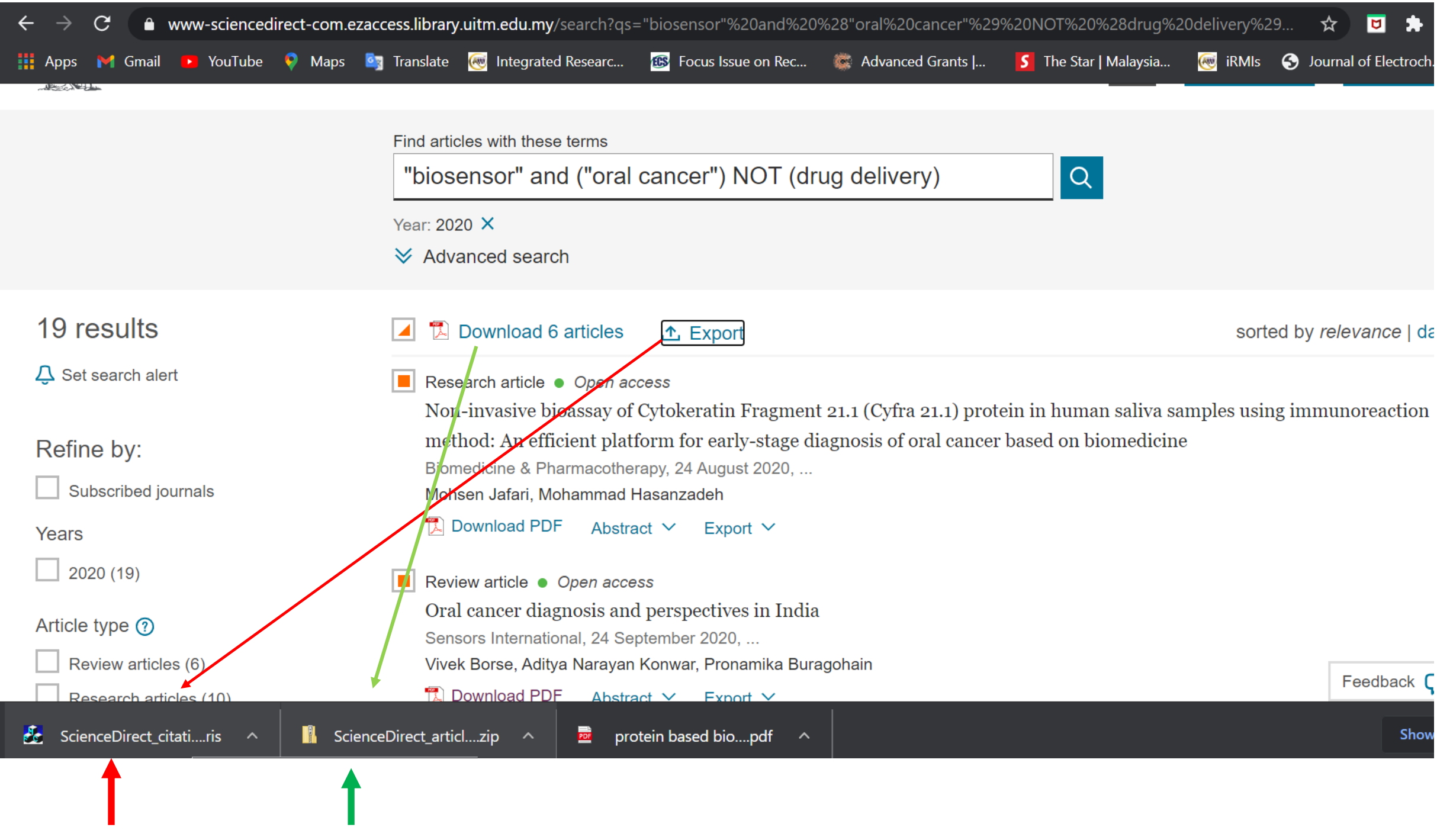
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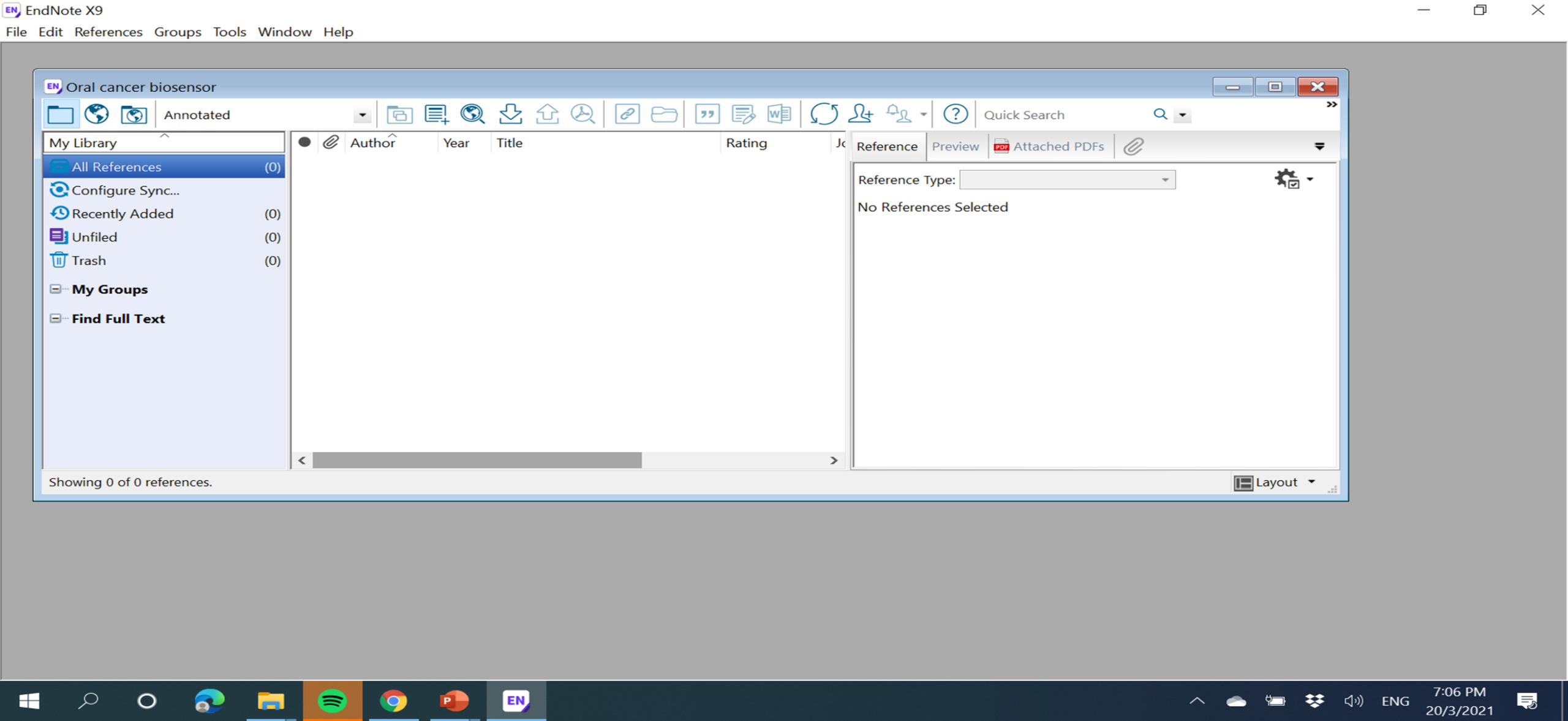

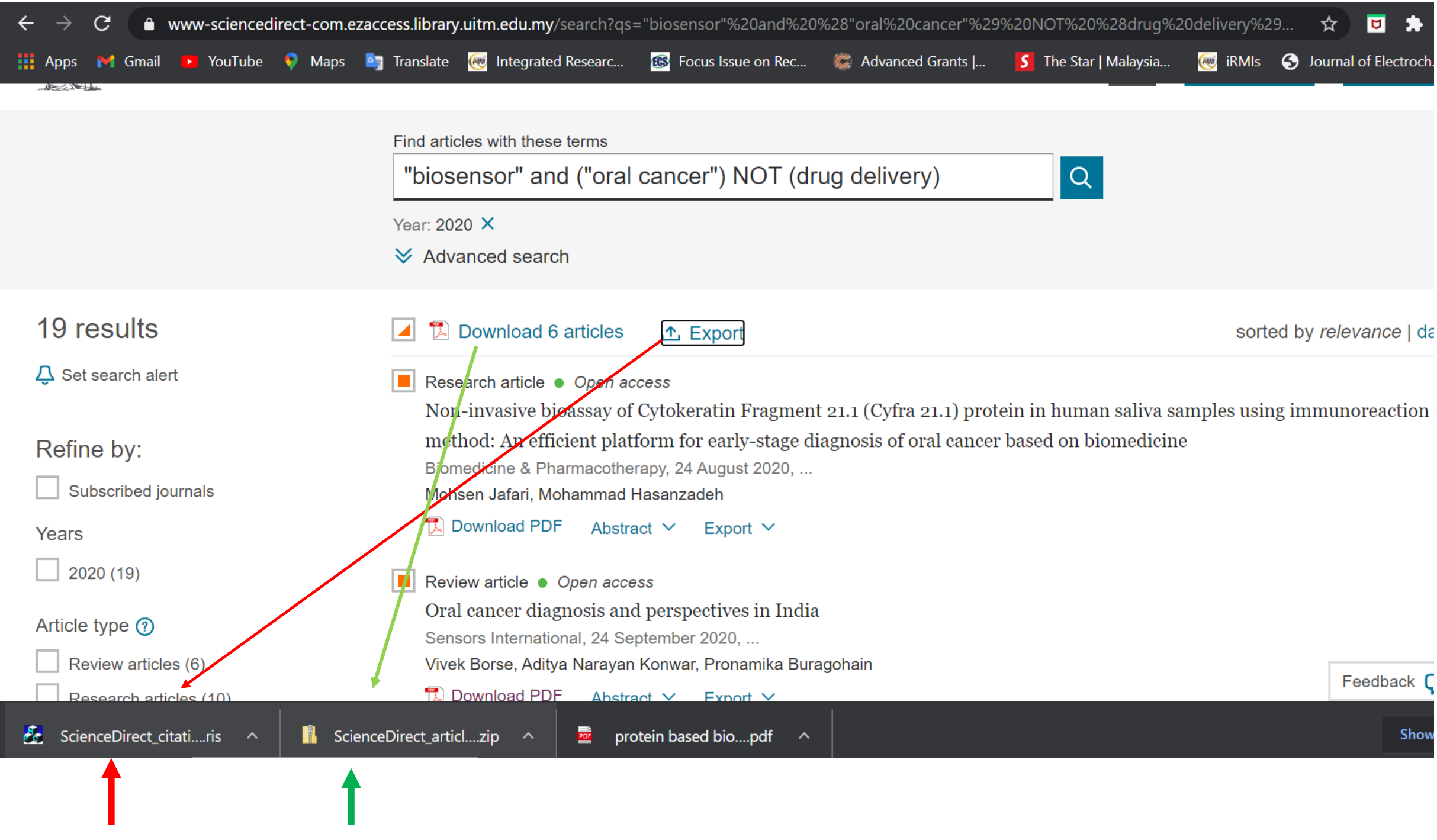
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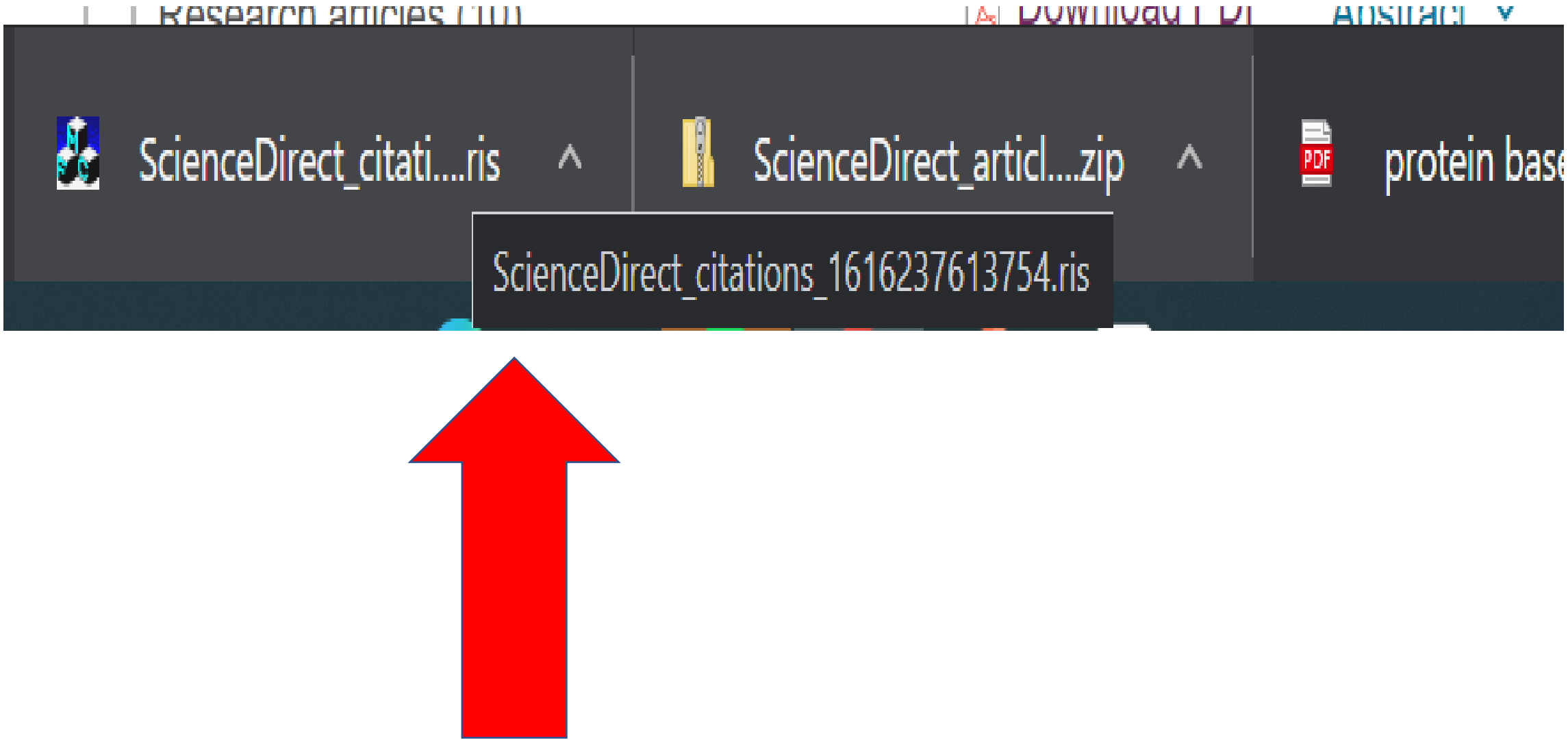
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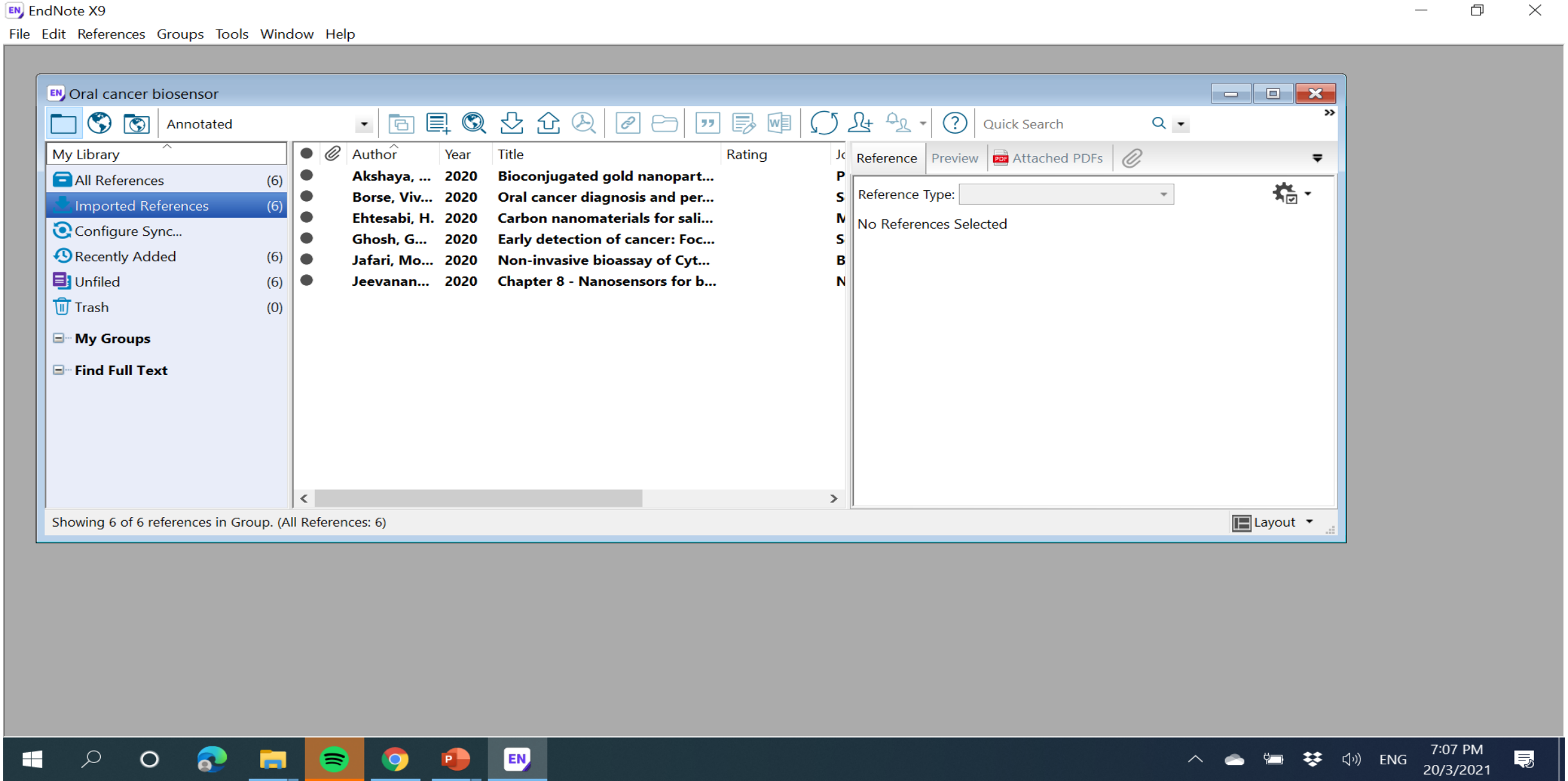

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Akshaya, K.
Arthi, C.
Pavithra, A. J.
Poovizhi, P.
Antinate, S. Shilpa
Hikku, G. S.
Jeyasubramanian, K.
Murugesan, R.

Year

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Bioconjugated gold nanoparticles as an efficient colorimetric sensor for cancer diagnostics

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Jeevanan...	2020	Chapter 8 -

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Keywords

Gold nanoparticles
Functionalization
Cancer detection
Color change
Colorimetric sensor
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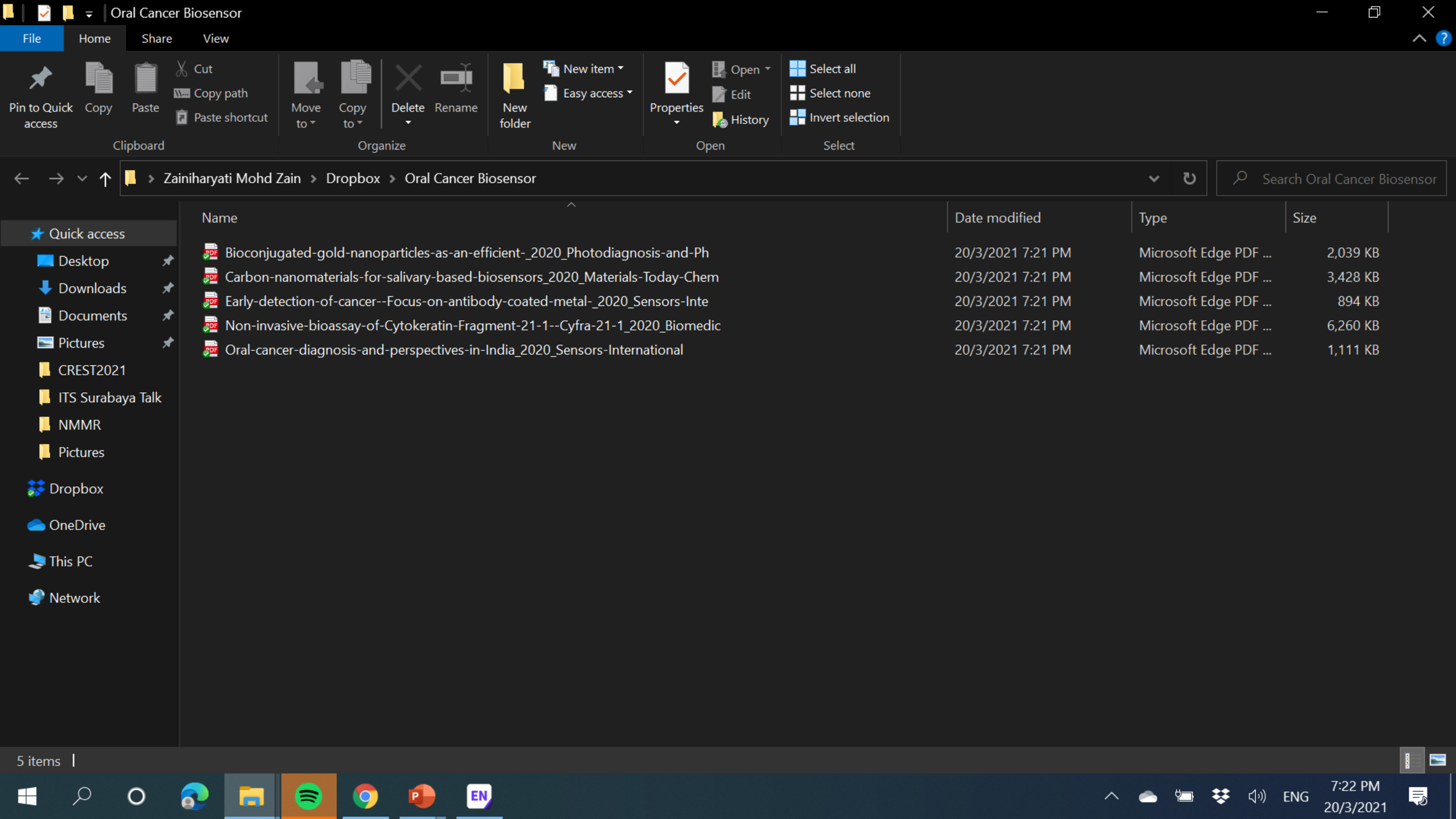
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Review

Bioconjugated gold nanoparticles as an efficient colorimetric sensor for cancer diagnostics

K. Akshaya[a,1], C. Arthi[a,1], A.J. Pavithra[a], P. Poovizhi[a], S. Shilpa Antinate[a], G.S. Hikku[a,*], K. Jeyasubramanian[b], R. Murugesan[c]

[a] Medical Bionanotechnology, Faculty of Allied Health Sciences, Chettinad Academy of Research and Education, Kelambakkam, 603103, Tamilnadu, India
[b] Department of Chemistry, Mepco Schlenk Engineering College, Sivakasi 626005, Tamilnadu, India
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ARTICLE INFO

Keywords:
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Cancer detection
Color change
Colorimetric sensor
Biosensor

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[a] Medical Bionanotechnology, Faculty of Allied Health Sciences, Chettinad Academy of Research and Education, Kelambakkam, 603103, Tamilnadu, India
[b] Department of Chemistry, Mepco Schlenk Engineering College, Sivakasi 626005, Tamilnadu, India
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1. Overview

In the present decade, intensive research has been carried out globally for early detection of cancer. Cancer is a disease of abnormal cell division or growth which may occur in almost every part of the human body [1–3]. Cancer/tumor is normally of 2 types; the first one is solid tumours (organ tumours) and the later is liquid tumours (blood cancer) where both types are characterised by abnormal growth [4,5]. Depending upon the nature of spread, tumour may sometimes also be classified as benign or malignant [6]. A benign tumour will remain confined to its original location; it does not invade surrounding tissue or spread to distant organs but still may need to be treated due to local signs and symptoms [7]. In contrast, malignant tumour invades nearby tissue and may spread throughout the body by a process termed me-

[10]. Also, it is estimated by WHO that 70 % of cancer occurrence is targeted to low- and middle-income countries. Depending on various parameters such as size, rate of growth, origin of spread, etc. the cancer can be differentiated into different stages such as stage I, stage II, stage III and stage IV [11]. The early diagnosis is vital to survival from cancer since the 5-year survival rate often depends on the stage at which the cancer is diagnosed [12].

Even though, there are many existing techniques available for cancer detection, they have their own inherent drawbacks such as false-positive/false-negative result, radiation exposure, delayed interpretation, cost and availability. [33,34]. Some of the existing cancer detection methods are tabulated in Table 1 Developing facile and quick respons methods especially sensor devices for identifying cancer is in its initial stage. However, the current methods adopted are bulky, complex

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Published in International Journal of Doctoral Studies | J. Gilmore et al. | 2016

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