

Literature review, information sources, and referencing

Monday 3rd July
Dr. Ellie Bennett

Overview of summer academic sessions

1

Project planning, research questions and critical reading
Date: Monday 26th July 11:00 – 13:00

2

Literature reviews, information sources and referencing
Date: Monday 3rd July, 11:00 – 13:00

3

Analysing and Presenting Results
Date: Monday 24th July, 11:00 – 13:00

4

Finding work in the UK after your postgraduate studies
Date: Monday 7th August, 11:00 – 13:00

Always follow the guidelines and deadlines for your specific schools.

Recap of session 1 – FAQs

1

Project planning, research questions and critical reading

Date: Monday 26th July 11:00 – 13:00

Slides and recordings will be made available shortly!

Who to contact?

- General questions related to these sessions:
Ellie Bennett (me) e.bennett.2@bham.ac.uk
- General support:
School wellbeing team.
- Subject specific questions:
 1. Project supervisor.
 2. Programme Lead.
 3. Head of PGT in school.

ESO can help direct you to the correct person.

Individual Research Project (Dissertation) 09 27519

College of Engineering and Physical Sciences | School of Metallurgy and Materials

Contact Details		
Name	email	Course Role
Professor David Book	d.book@bham.ac.uk	Programme Lead
Mrs Andrea Malin	a.d.malin@bham.ac.uk	PGT Administrator
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Recap of session 1 – Main content

1

Project planning, research questions and critical reading

Date: Monday 26th July 11:00 – 13:00

Task Name	Q1 2019			Q2 2019		Q3 2019
	Jan 19	Feb 19	Mar 19	Apr 19	Jun 19	Jul 19
Planning						
Research						
Design						
Implementation						
Follow up						

<https://www.productplan.com/glossary/gantt-chart/>

Critical Reading

Level 1: Overview of paper

- What is the aim of the paper?
- How are the aims of the paper addressed?

Level 2: Strengths and weaknesses of paper

- How strong is the evidence for/against?
- What are the limitations of the work?
- What are the broader impacts of the work?
- What are the strengths/weaknesses of their methodology or techniques?

Level 3: Applying to your own work

- How is this relevant to your own work?

Reading academic literature **efficiently**



1) Find a paper



2) Decide if the paper is worth reading.



3) Critically read the paper.

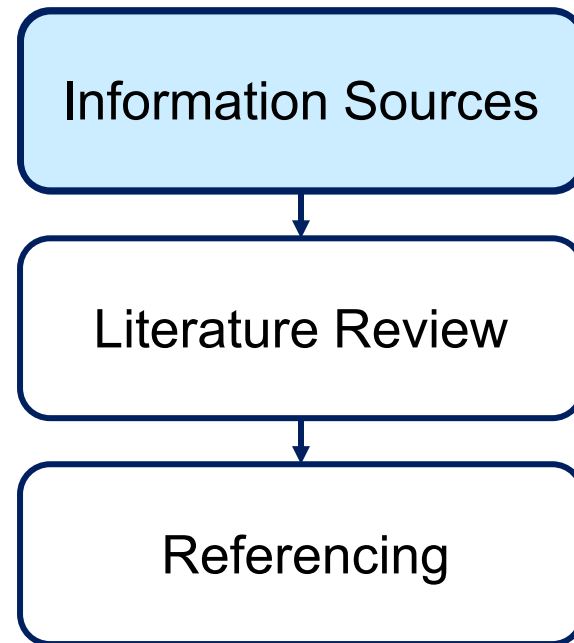


4) Save the paper.

Overview of today's session

2

Literature reviews, information sources and referencing
Date: Monday 3rd July, 11:00 – 13:00



How do **you** find relevant literature or information?

- What are you looking for?
 - Where do you look?
 - What do you search for?



Discuss with your neighbours!

What are you looking for?

Broader: review of a topic,
field, method, technique etc.

Narrower: specific
research aims.



Peer reviewed literature

Different types of literature: books, **reviews**, **articles**, **letters**.

- ✓ Has been rigorously reviewed by peers in the field.
- ✓ Your literature review and research aims should be based on peer reviewed literature.



Non-peer reviewed work

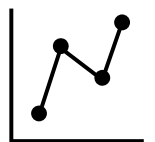
Websites, news sources, blogs, Wikipedia, etc.

- ✗ **Not** rigorously reviewed by peers in field.
- ~ Use very cautiously. Only certain situations where this is appropriate.



Possible exception: arXiv papers (pronounced “archive”)

These papers are open-access preprints **before** peer review.



Datasets

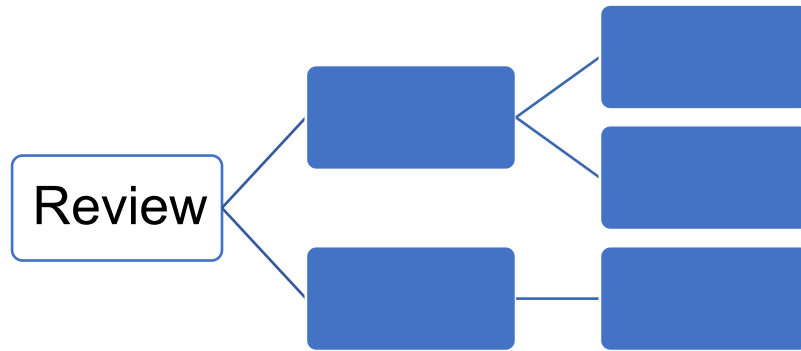
What type of information?

Examples for Machine Learning: Kaggle, UCI Machine Learning Repository

Where can you search?

References in reviews or papers

Reviews often contain >100 references and are a good place to find other relevant papers.



Databases

The library has **Subject Guides** that lists useful databases for each subject.

ACADEMIC SKILLS GATEWAY

Reading and note-taking



Writing and critical thinking



Using library resources



<https://libguides.bham.ac.uk/?b=s>

Activity: Share a **database** that is useful for your subject using the QR code:

Example: Chemistry - SCOPUS

1. Navigate to the **Academic Skills Gateway**.
2. Find your **subject guide**:
Using Library Resources -> Subject Guides
3. Look for recommended databases under **Journals** tab.

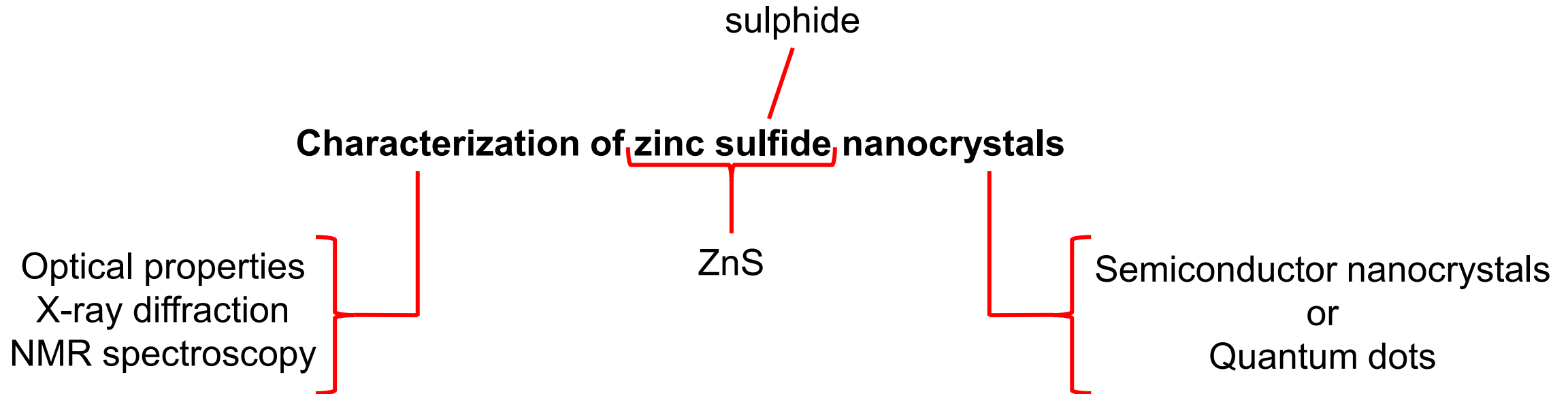


What do you search for?

Steps for effective and efficient searching:

1. Brainstorm **key words**

- Alternative spelling?
- Alternative names?
- Synonyms?

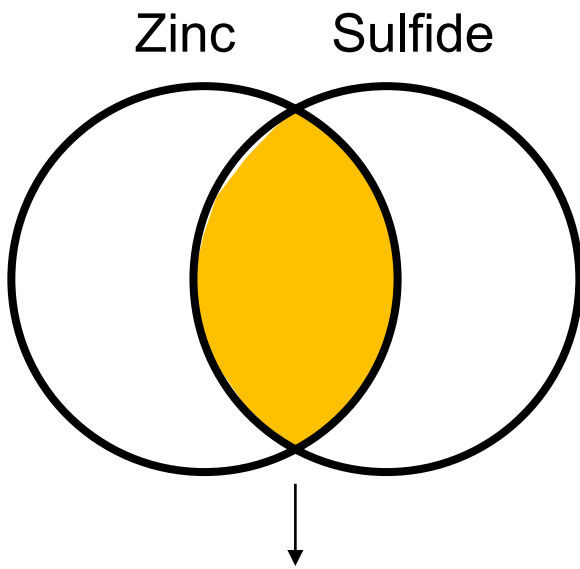


What do you search for?

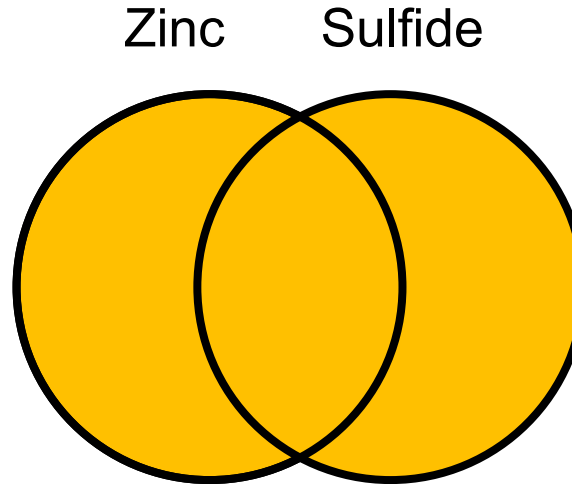
Steps for effective and efficient searching:

1. Brainstorm **key words**
2. Use **Boolean operators** when searching

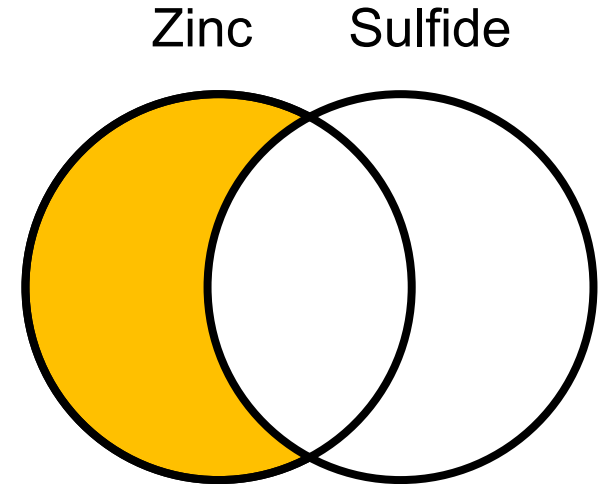
Zinc **AND** Sulfide



Zinc **OR** Sulfide



Zinc **AND NOT** Sulfide



AND returns articles containing both “zinc” and “sulfide”, though not necessarily next to each other.

What do you search for?

Steps for effective and efficient searching:

1. Brainstorm **key words**
2. Use **Boolean operators** when searching
3. Use “...” to search for **specific phrases**



Search input: zinc sulfide

Returns articles containing the words **zinc** and **sulfide** in them.

Searches for zinc **AND** sulfide
(note: some databases will
default to **OR** instead of **AND**).



Search input: “zinc sulfide”

Returns articles containing the phrase “**zinc sulfide**” in them.

What do you search for?

Steps for effective and efficient searching:

1. Brainstorm **key words**
2. Use **Boolean operators** when searching
3. Use “...” to search for **specific phrases**
4. Use **filters** on databases to narrow the results

Date range

Type of article

Extra keywords

Journal

Author

Language

Summary and general advice



Determine key words and phrases.

Consider alternative spelling, synonyms, abbreviations etc. Use phrases, Boolean operators and filters.



Apply search strategies systematically to different databases.

Apply the same search criteria to multiple databases to ensure a rigorous search.



Find a few relevant reviews and follow important references.

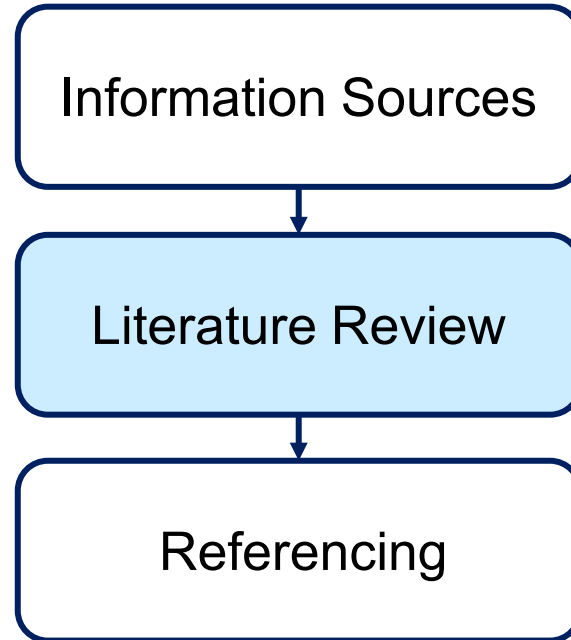
Start by identifying a few reviews that cover your topic or methodology/technique. Identify key areas and explore the referenced papers.



Apply critical reading strategies discussed in last session!

Be efficient – decide whether a paper is relevant. If it is, apply critical reading questions and think about how it applies to **your** project.

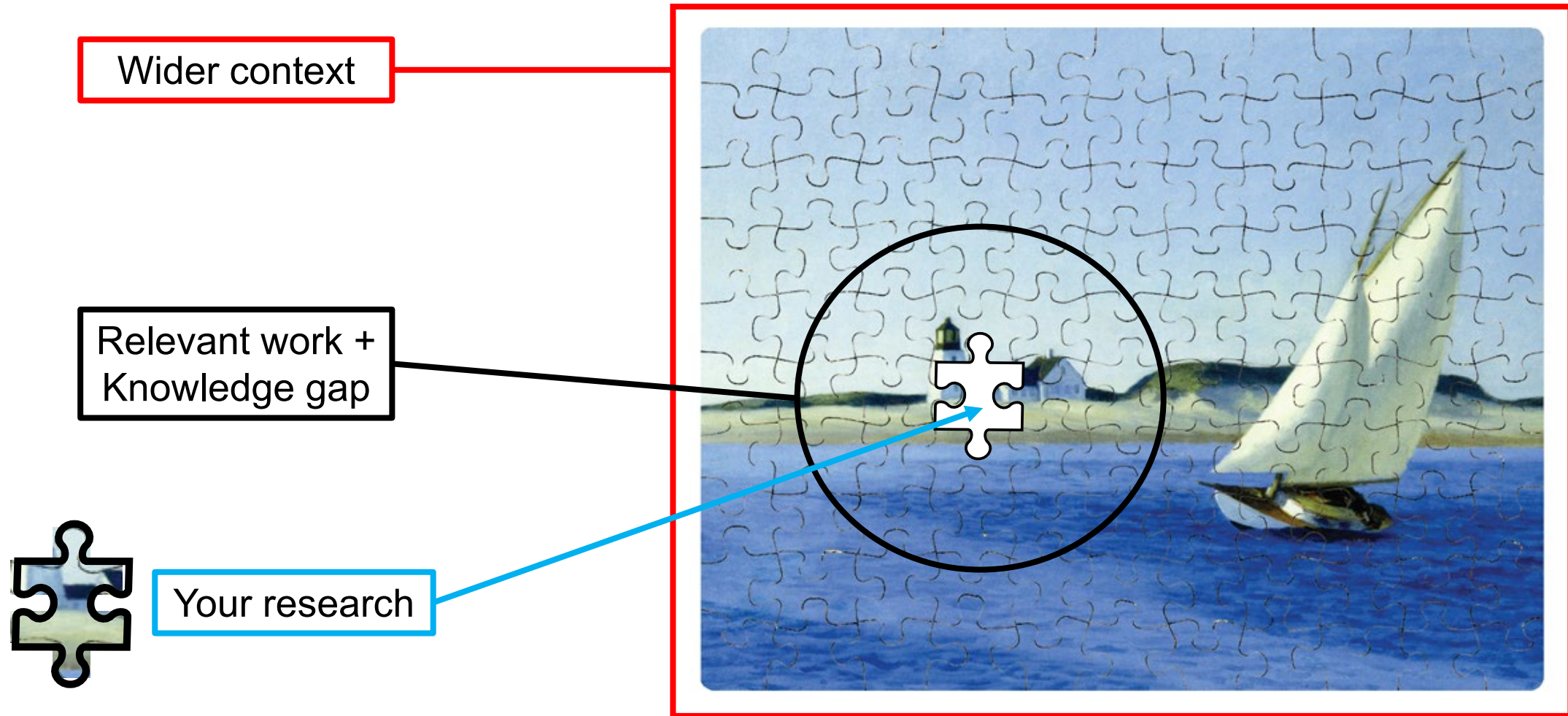
Overview of today's session



Why do we have a “literature review” or “relevant literature” section in a project report?

Literature review sets the context and importance of **your work**

A well-written introduction and literature review will tell the reader the **wider context of the work**, what the **knowledge gaps** are, and **why your work is important**.



Where a literature review fits into a report

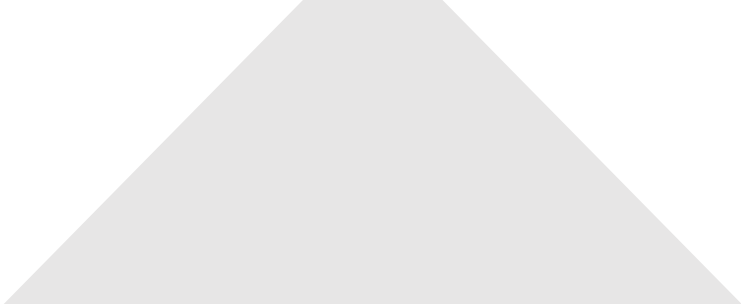
Broad



Narrow



Broad



Introduction
Background & Literature Review

Results
Methodology

Discussion
Conclusions
Impact & Future work

Structuring a literature review – general advice

Background



Start broad (background), then get narrower.

Idea 1

Key findings
Knowledge gap



Split into themes or ideas.

Explain the key findings and emphasize the knowledge gap or challenges for each theme or idea.

Idea 2

Key findings
Knowledge gap



Organize ideas in a logical order.

How would you explain it to someone?
Think about clearest way to present information.

Idea 3

Key findings
Knowledge gap



Summarize knowledge gaps and outline how your work fits in.

Summary of knowledge gaps
How your work addresses it
(briefly)

Structuring a literature review – example

■ INTRODUCTION

Semiconductor nanocrystals that emit visible light, including CdS, CdSe, CdSe/CdS, ZnSe, and InP, are highly desirable for solid-state lighting, imaging, electroluminescent displays, and down conversion applications.^{1–3} ZnS plays an important role in many of these technologies as a shell material that improves the photophysical properties of the core nanocrystals.

Why nanocrystals and ZnS are important

(mono- or dual-doped) with long-lived excited lifetimes, useful for sensing and imaging applications.^{7–10} Furthermore, pure ZnS nanocrystals can serve as a seed for more complex heterostructures such as blue-emitting spherical quantum wells (i.e., ZnS/ZnSeTe/ZnS),¹¹ whose architecture mitigates interfacial strain and further increases PLQY.¹²

Unsurprisingly, a variety of methods have been developed to grow ZnS shells. To control the reactivity and ensure shells grow without separately nucleating ZnS, precursors are often added slowly via a syringe pump,^{13–15} in sequential steps, such as in successive ion layer adsorption and reaction (SILAR).^{16–20}

1. Challenges making ZnS nanocrystals

aqueous media, those that use elemental sulfur or thioacetamide precursors,^{33–41} or single-source precursors,^{42,43} it remains challenging to finely control ZnS nanocrystal sizes. Many examples achieve sizes too large to exhibit quantum confinement or require the precursor reaction to be terminated prematurely to obtain small sizes.^{33,36,43,44} Other reports describe problems with colloidal stability and aggregation.^{30,37,45–47}

Similarly, controlling the shape of ZnS is very important to optoelectronic properties and spectral line widths. While ZnS nanoplatelets,^{48–50} nanorods,^{49,51} and nanowires^{48,52} have all been reported, the characterization and uniformity of these shapes lags behind heavier II–VI counterparts. In addition, ZnS shells often form islands that are attributed to the effects of interfacial strain.^{53,54} Improved synthetic methods that

control these structural features could improve the performance of emissive quantum dots.

2. Challenges controlling size and shape of ZnS

no such measurements on ZnS have been reported, preventing particle concentrations and yields from being easily extracted from UV absorbance spectra.

There is also significant disagreement between reports describing the size dependence of the absorption spectrum of ZnS.^{28,42,59} The inconsistencies are likely the result of error in common sizing methods, including electron microscopy (EM), leading to a range in nanocrystal sizes reported for the same energy of transition (Figure S32 and Tables S3–S5).^{27–33,37,40–43,47,59–66} Compared to CdE and PbE materi-

3. Challenges measuring size of ZnS nanocrystals

enials),⁶⁷ however, zinc isotope patterns, broad distributions that depend on ligands and their coverage, as well as the formation of multiply charged species and fragmentation complicate the interpretation of this data. The sizes of nanocrystals have also been estimated using the Brus equation,^{70,71} which is known to overestimate sizes, particularly for ZnS nanocrystals ($d < 3$ nm).²⁷

X-ray scattering techniques such as small-angle X-ray scattering (SAXS) and X-ray pair distribution function

4. Recent advances in nanocrystal sizing

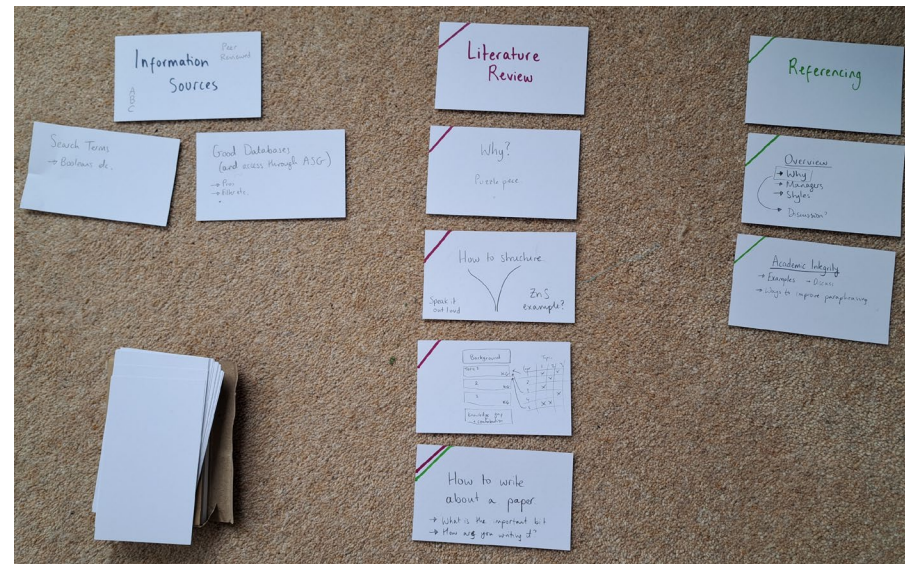
internal stacking faults have been demonstrated in different nanocrystal systems,^{74,77,78} including ZnS.^{79,80}

Following previous work on the synthesis of PbS and CdS nanocrystals from thiourea derivatives,^{81,82} we targeted a

This work addressing gaps highlighted

analysis. The effect of precursor structure, surfactants, and temperature on the final crystal size and shape is described.

Find a way to help you organize the topics in an order that makes sense!



Key results

- Developed new synthetic route to ZnS nanocrystals (1) with control over the size and shape (2).
- Applied recent techniques (4) to size ZnS nanocrystals and derive a sizing calibration curve (3).

Structuring a literature review – structuring paragraphs

Background

Idea 1
Key findings
Knowledge gap

Idea 2
Key findings
Knowledge gap

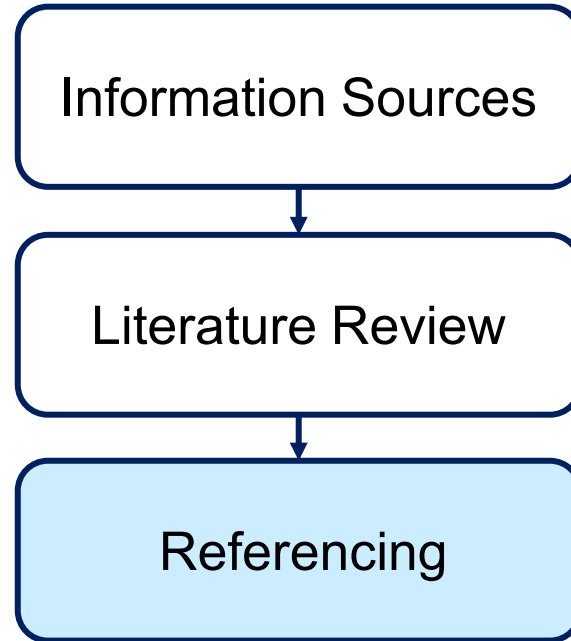
Idea 3
Key findings
Knowledge gap

Summary of knowledge gaps
How your work addresses it
(briefly)

- For each idea:
- Explain key idea, results, methods etc.
 - Highlight any limitations, knowledge gaps
 - **Reference relevant papers**

	Idea 1	Idea 2	Idea 3
Paper A	✓	✓	
Paper B		✓	
Paper C	✓		✓
Paper D			✓
Paper E	✓		

Overview of today's session



Writing about other people's work

Anything that is not your original work or ideas needs a citation.
Work by others should be summarized and paraphrased.

- ✓ **Give credit to those who deserve it.**
- ✓ **Allows people reading your work to find relevant information.**
- ✓ **Avoid academic integrity violations.**
 - Figures or equations without citations.
 - Poor paraphrasing (too similar to original text).
 - Mistakes in referencing leading to ambiguity.
 - Self-plagiarism.

Repercussions can be
severe, whether the violation
was intentional or not.

How to write about other people's work



Be descriptive – explain the key finding.

✗ X studied chickens and eggs [ref to paper by X].

✓ Eggs came before chickens [ref to paper by X].



Be objective in your analysis.

✗ The finding that eggs came before chickens is probably correct.

✓ The finding that eggs came before chickens was supported by factor 1, 2, and 3.



Use your own words – summarize and paraphrase.

Summarize = shorten

Paraphrase = rephrase in your own words

Paraphrasing discussion 1

Original:

In day-to-day life, we generally think about interacting with macroscale objects. However, interesting properties arise on the nanoscale that are often distinct from the bulk properties. Herein we will focus on nanocrystals, and of particular interest are nanocrystals with a diameter less than 10 nanometers (nm). On these length scales the surface area is very high. This means that of all the total atoms making up the nanocrystal, a significant fraction are at the surface, contributing to the difference in properties between the nanoscale and bulk. For example, for a ZnS nanocrystal with a diameter of ~ 2 nm, approximately half the atoms are on the surface, and half are within the crystal. (E. Bennett, PhD Thesis Draft, 2021)

Attempt 1:

In everyday life, we **often** think about interacting with macroscale **items**. However, **fascinating assets** arise on the nanoscale that are **frequently different** from the greater part properties. Herein we will **concentrate** on nanocrystals, and of **specific importance** are nanocrystals with a **span under** 10 nanometers (nm). On these **distances** the surface **expanse** is very **great, implying** that of all the total atoms **creating** the nanocrystal, a **noteworthy portion** are at the **exterior, leading** to the **change in assets** between the nanoscale and bulk. For **instance**, for a ZnS nanocrystal with a **breadth** of ~ 2 nm, **around** half the atoms are on the **exterior**, and half are **inside** the crystal.

Discuss with your neighbour: is this paraphrasing? What are the strengths and weaknesses?

Not paraphrased.

Paraphrasing discussion 2

Original:

In day-to-day life, we generally think about interacting with macroscale objects. However, interesting properties arise on the nanoscale that are often distinct from the bulk properties. Herein we will focus on nanocrystals, and of particular interest are nanocrystals with a diameter less than 10 nanometers (nm). On these length scales the surface area is very high. This means that of all the total atoms making up the nanocrystal, a significant fraction are at the surface, contributing to the difference in properties between the nanoscale and bulk. For example, for a ZnS nanocrystal with a diameter of ~ 2 nm, approximately half the atoms are on the surface, and half are within the crystal. (E. Bennett, PhD Thesis Draft, 2021)

Attempt 2:

We generally think about interacting with macroscale objects in day-to-day life. Often, bulk properties are distinct from interesting nanoscale properties. Here, we will focus on nanocrystals with a diameter of under 10 nm. The difference in properties between the nanoscale and bulk is because a significant fraction of the atoms are at the surface because the surface area is very high at these length scales. Almost half of the atoms are at the surface, and half inside the nanocrystal, in a ZnS nanocrystal with a diameter of ~ 2 nm.

Discuss with your neighbour: is this paraphrasing? What are the strengths and weaknesses?

Not paraphrased.

Paraphrasing discussion 3

Original:

In day-to-day life, we generally think about interacting with macroscale objects. However, interesting properties arise on the nanoscale that are often distinct from the bulk properties. Herein we will focus on nanocrystals, and of particular interest are nanocrystals with a diameter less than 10 nanometers (nm). On these length scales the surface area is very high. This means that of all the total atoms making up the nanocrystal, a significant fraction are at the surface, contributing to the difference in properties between the nanoscale and bulk. For example, for a ZnS nanocrystal with a diameter of ~ 2 nm, approximately half the atoms are on the surface, and half are within the crystal. (E. Bennett, PhD Thesis Draft, 2021)

Paraphrase the paragraph above. Remember:

- Do not just use synonyms and rearranging sentences.
- Good paraphrasing contains the key idea written in your own words.

Attempt 3:

A high percentage of the total atoms in a nanocrystal can be found at the surface, resulting in differing properties from the bulk material. (E. Bennett, PhD Thesis Draft, 2021)

Make sure to cite all work that is not your own!

Anything that is not your original work or ideas needs a citation.
Work by others should be summarized and paraphrased.

Reference Managers

- Directly import references into a reference manager.
- Often have Word plug-in, meaning citations can be added directly into Word in the specified style.
- Common options:

EndNote



Mendeley



Zotero



See more here:

<https://intranet.birmingham.ac.uk/as/libraryservices/library/referencing/icite/index.aspx>

<https://intranet.birmingham.ac.uk/as/libraryservices/library/referencing/icite/software.aspx>

Referencing Styles

- Different journals and disciplines use specific referencing styles.
- Follow any school or supervisor guidelines.
- **Be consistent in your referencing style.**

IEEE:

“Solitons have been identified in flowing chains of vortices in thin film superconductors [1]. An interstitial vortex in a periodic potential forms a sine-Gordon soliton around it.”

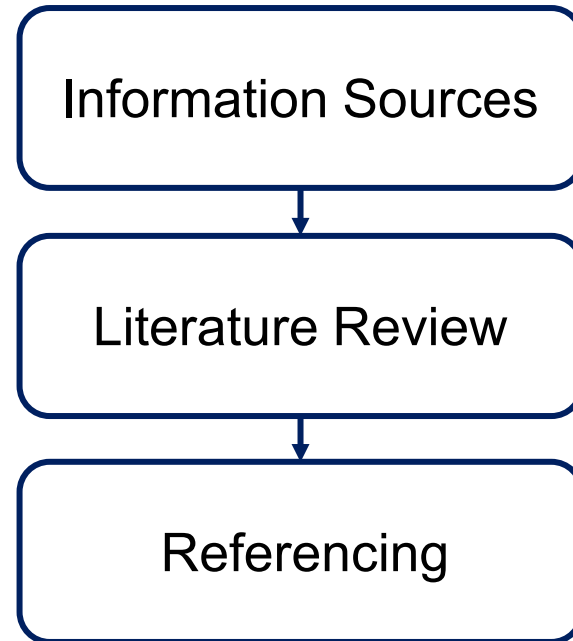
See more here:

<https://intranet.birmingham.ac.uk/as/libraryservices/library/referencing/icite/why-reference.aspx>

<https://www.citethemrightonline.com/tutorial>

See the Academic Skills Gateway ☺

Overview of today's session



Next time:

Analysing and presenting results
Monday 24th July, 11:00 – 13:00
