

44826\_SHASHA\_BINTI\_AZ...  
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SMEB4181 Final report Gr...  
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Act as my professor and grade my assignment according to the rubric. Be very critical. Ensure scientific accuracy and correctness with citation from reputable journals.



Thought for 7m 32s >

I'm grading this using the provided rubric (1 = unacceptable, 5 = expert) for **Presentation, Analysis (overall), Application of Scientific concepts, and Quantitative Reasoning.**

SMEB4181 Final report Grading J...

## Scores (with blunt justifications)

### 1) Presentation — 3 / 5

You have a recognizable thesis structure (chapters, figures, tables), and the flow is generally readable. 44826\_SHASHA\_BINTI\_AZMAN\_...\_U200...

But there's a **major professionalism error**: your title is inconsistent about the surfactant identity—cover/title page says **sodium deoxycholate**, while the declaration and abstract header say **sodium cholate**. 44826\_SHASHA\_BINTI\_AZMAN\_...\_U200... 44826\_SHASHA\_BINTI\_AZMAN\_...\_U200...

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Those are not synonyms; they're different molecules, and that undermines trust in the whole report before anyone reaches your results.

### 2) Analysis (overall) — 2 / 5

Your core narrative is: "higher NaDC → better exfoliation" and you interpret UV-Vis + microscopy + profilometry as support. 44826\_SHASHA\_BINTI\_AZMAN\_...\_U200...

The problem is that the logic often jumps to the "desired" conclusion without ruling out simpler explanations.

Example: you say the A/B excitonic absorption features should appear around **~520 nm and ~620 nm** and then argue that peaks become "less obvious" at higher concentration because of exfoliation/quantum confinement. 44826\_SHASHA\_BINTI\_AZMAN\_...\_U200...

Yes, WS<sub>2</sub> commonly shows A/B excitonic features around those wavelengths. PMC

But your own spectra at high concentration look **dominated by baseline/saturation**

**effects** (very different absorbance scales), and you don't show a controlled approach (e.g., dilution to keep absorbance in a linear regime, baseline subtraction, normalization). Without that, "peak disappearance = more exfoliation" is **not a secure inference**.

Also: you claim an "optimum" at 8 g/L primarily from thickness + surface area arguments, but you never measure **yield** (concentration of dispersed WS<sub>2</sub>) or give a real **size distribution**. In the LPE literature, surfactant concentration can change both **yield and nanosheet dimensions**, so "optimum" must be defined and quantified (not eyeballed). ACS Public...

### 3) Application of Scientific concepts — 2 / 5

You correctly introduce Beer–Lambert law and what UV–Vis can tell you.

You also state the standard Tauc relation and exponents (direct allowed vs indirect allowed). 44826\_SHASHA\_BINTI\_AZMAN\_U200...

But there are conceptual errors serious enough to cap this score:

- You list **tungsten dioxide (WO<sub>2</sub>)** as a "prominent" example under *Transition Metal Dichalcogenides*. That's simply wrong: TMDCs are **transition metal + chalcogen** layered compounds (e.g., WS<sub>2</sub>, MoS<sub>2</sub>). 44826\_SHASHA\_BINTI\_AZMAN\_U200... Astrophysics Da...
- You repeatedly interpret **stylus profilometer step height of a drop-cast film** as "nanosheet thickness." Your method explicitly describes drop-casting and using the film/substrate edge to estimate "mean thickness of the nanosheets." 44826\_SHASHA\_BINTI\_AZMAN\_U200... That is **not** a valid way to measure individual WS<sub>2</sub> nanosheet thickness (layer number). It measures a *film* that can include aggregates and stacked flakes.


### 4) Quantitative Reasoning — 1 / 5

This is the weakest part.

You do report averages ± spread for profilometry step heights (e.g., 0.359 ± 0.090 μm down to 0.046 ± 0.003 μm). 44826\_SHASHA\_BINTI\_AZMAN\_U200...

But quantitatively, the work is missing the basics of defensible inference:

- No replicate UV–Vis runs, no error bars, no statistical treatment of peak positions/intensities.
- Tauc analysis is shown for **only one condition (2 g/L)** even though you claim "different concentrations." 44826\_SHASHA\_BINTI\_AZMAN\_U200...

- No conversion from absorbance to absorption coefficient is demonstrated (despite defining  $\alpha$ ), and in dispersions this step is nontrivial.  44826\_SHASHA\_BINTI\_AZMAN\_...\_U200...
- No yield metric (mg/mL, extinction-coefficient method, filtered mass) even though surfactant concentration is known to affect yield in LPE. ACS Publications Science

Overall rubric average:  $(3 + 2 + 2 + 1) / 4 = 2.0 / 5$ .

## The biggest scientific issues you must fix (highest impact)

### 1. Surfactant identity confusion (NaC vs NaDC)

Your report alternates between *sodium cholate* and *sodium deoxycholate*.

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That is a fundamental experimental descriptor. A reader cannot be confident what you actually used.

### 2. Profilometry “thickness” is being misinterpreted

You computed thickness from “film/substrate edge” step heights.

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Stylus profilometry on deposited films is known to overweight thick/aggregated regions compared with flatter areas, so it can badly misrepresent nanosheet thickness distributions. ACS Publications

If your scientific claim is “higher NaDC produces thinner nanosheets,” you need **AFM (with statistics)** or TEM layer-counting approaches, not a drop-cast film step height.


### 3. Bandgap / exciton interpretation needs stronger control

You cite excitonic peaks and use them as exfoliation evidence.


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WS<sub>2</sub> monolayer vs bulk physics is well-established (bulk indirect ~1.3 eV; monolayer direct ~2.1 eV). ScienceDirect

Your extracted Tauc values (1.69 eV direct, 1.51 eV indirect at 2 g/L)

 44826\_SHASHA\_BINTI\_AZMAN\_...\_U200... might happen depending on thickness distribution + methodology, but right now the analysis isn’t rigorous enough to defend them (single condition shown; unclear  $\alpha$ ; scattering not addressed).

### 4. “Optimum concentration” is not quantitatively defined

You conclude 8 g/L is optimal mainly because it’s “comparable” in thickness to 10 g/L but with larger surface area.  44826\_SHASHA\_BINTI\_AZMAN\_...\_U200...

But LPE optimization in the literature often treats **yield** and **nanosheet dimensions** together, and surfactant concentration can push you into regimes of fragmentation vs stabilization. ACS Publications

Also, bile-salt surfactants have critical micellization behavior, and you never discuss whether your concentration range spans relevant micellar regimes (even though this can matter for stabilization). [bdigital.ufp.pt](#)

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## What would most efficiently raise your grade

- Fix the NaC/NaDC inconsistency everywhere (title, declaration, abstract, methods).  
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- Add **quantitative yield** (even a simple filtered mass per volume, or absorbance-based concentration using a cited extinction coefficient approach consistent with LPE literature). [Science](#)
- Replace “profilometry thickness of drop-cast film” with **AFM thickness statistics** (histograms of layer number) or clearly relabel it as **film thickness/roughness**—not nanosheet thickness. [ACS Publications](#)
- For UV–Vis: standardize the measurement (dilute to comparable absorbance ranges, baseline correct, report peak positions with uncertainty), and interpret A/B excitons accordingly. [PMC](#)
- Show Tauc analysis consistently (either for all concentrations or justify why only one), and make the  $\alpha$  conversion explicit. [44826\\_SHASHA\\_BINTI\\_AZMAN\\_-\\_U200...](#)
- Fix the TMDC definition error ( $\text{WO}_2$  is not a TMDC). [44826\\_SHASHA\\_BINTI\\_AZMAN\\_-\\_U200...](#)  
[Astrophysics Da...](#)

If you treat those as “non-negotiable corrections,” the project becomes much more scientifically defensible—and your rubric scores jump fast.

Sources

        Sources