Template for Scientific Seminar Presentations

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How to use

- This is a template for presenting a scientific manuscript that's not your own in a seminar class, journal club, etc.
- Not intended to be a good format for presenting your own original research (although it may be helpful).
- Emphasizes the big picture; aims to discourage "beginning to end" article reading and processing.
- Also aims to improve the usefulness of the presentation for the non-expert or student audience.
- Designed for 15-25 minute presentation. Most straightforward to adjust by changing number of "Background" and "Interesting Figure" slides.
- Next page has general slide list and guidelines for each slide (these are also shown as red comments on the template slides).

List of Slides

- **Title Page:** Bibliographic information of article, your name, and (ideally) a compelling or colorful picture from the article
- **System of Interest:** Which molecules, complexes, cells, organisms, populations, etc. are studied in this paper?
- **Main question:** What interesting thing is unknown that the authors set out to learn more about?
- **Background Slides:** (number can be adjusted based on desired length of presentation)
    - Background Slide 1: Information necessary to understand your other slides. Including images from the web is fine (and encouraged) but cite the source.
    - Background Slide 2 : “”
    - Background Slide 3 : More advanced background information related to one aspect of the paper that particularly interested you.
- **Main question**: Repeating the main question allows the audience to reconsider it with whatever new background information they learned. Sometimes it makes sense to make this main question slide more specific.
- **General Approach:** What techniques did the authors use? X-ray crystallography, FRAP, fluorescence quenching, molecular dynamics, mutagenesis etc? No detailed methods.
- **Interesting Figures:** Choose 3 figures from the paper that are most relevant to addressing the main question or you find particularly interesting. (number can be adjusted based on desired length of presentation)
    - Interesting Figure Slide 1: No more than four panels. Make sure to copy the caption(s) for these panels directly into the slide (don’t paraphrase). ***Be ready to explain orally what the figure shows and why it’s relevant.***
    - Interesting Figure Slide 2: “ ”
    - Interesting Figure Slide 3: “ ”
- **Relevant Conclusions:** 2-4 bullet points with insights the researchers gained into the ‘main question’.
- **Impressions:** 2-4 bullet points with comments on aspects of the paper you appreciated, found surprising, think could be improved, etc.

Title page with bibliographic information of article, your name, and (ideally) a compelling or colorful picture from the article

Discussion of

Biophysical Journal Volume 109 November 2015 1959–1968

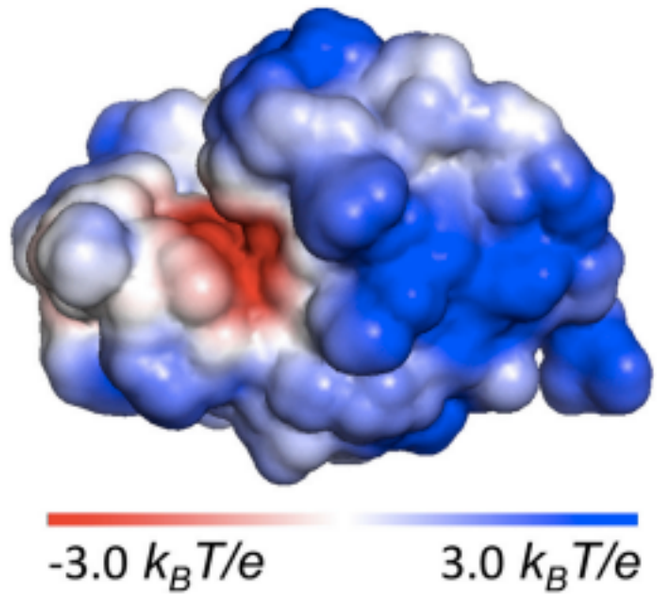
Article

Lack of Dependence of the Sizes of the Mesoscopic Protein Clusters on Electrostatics

Maria A. Vorontsova,[1] Ho Yin Chan,[2] Vassiliy Lubchenko,[2,3] and Peter G. Vekilov[1,3,*]
[1]Department of Chemical and Biomolecular Engineering, [2]Department of Physics, and [3]Department of Chemistry, University of Houston, Houston, Texas

for CIB 565: Essentials of Biophysics

Grace Brannigan



Which molecules, complexes, cells, organisms, populations, etc. are studied in this paper?

System of interest

- "Mesoscopic clusters" of 10^5 to 10^6 proteins that form in solution

- May form by similar mechanism as plaques or other aggregates in Alzheimer's, prion diseases, etc.

- Model system : lysozyme at a range of pH and ionic concentrations

Main question : What interesting thing is unknown that the authors set out to learn more about?

Main question

These clusters are surprising and don't fit theories that predict formation of other types of clusters. **Why do they form?**

Background Slide 1 : Information necessary to understand your other slides. Including images from the web is fine (and encouraged) but provide a link or citation.

Three classes of clusters

Class I: 2-10 protein molecules

Class II: ~1000 molecules

Balance between short-range **attractions** and long-range screened electrostatic **repulsions** determines size.

Class III: 10^5 to 10^6 protein molecules

But theories for I & II **don't** predict clusters like Class III clusters, which are:

- much larger
- have size independent of protein concentration
- constitute such a small fraction of the overall protein

Background Slide 2 : Information necessary to understand your other slides. Including images from the web is fine (and encouraged) but provide a link or citation.

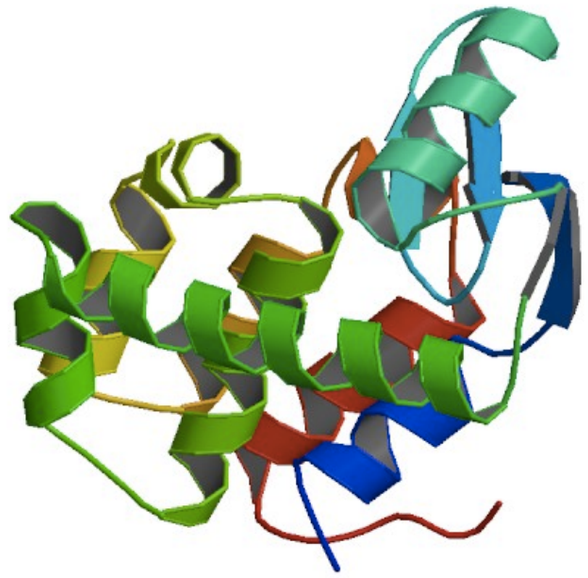
lysozymes

- enzymes (glycoside hydrolyses) that attack sugars in bacterial cell wall

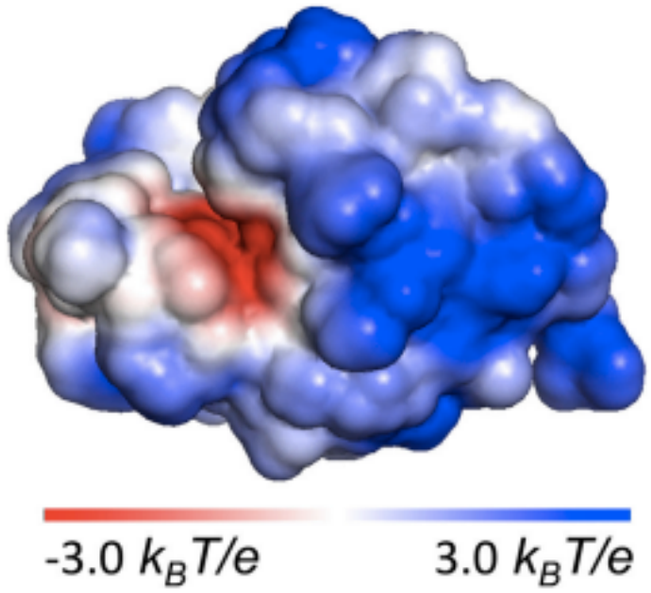
- High positive charge at pH 7 (highly basic)

- about 150 residues (relatively small)

- Known to form clusters of Class III



http://www.rcsb.org/pdb/explore/explore.do?structureId=2LZM



Background Slide 3: More advanced background information related to one aspect of the paper that particularly interested you.

Background Slide 3

Several possibilities for this slide including

- Brownian microscopy
- Dynamic light scattering
- Oligomer Model

Repeat Main Question : Repeating the main question allows the audience to reconsider it with whatever new background information they learned. Sometimes it makes sense to make this main question slide more specific.

Main question

These large, concentration-independent protein clusters are surprising and don't fit theories that predict formation of other, smaller clusters. **Why do they form?**

General Approach: What techniques did the authors use? X-ray crystallography, FRAP, fluorescence quenching, molecular dynamics, mutagenesis etc? No detailed methods.

Approach

Systematically adjust charges in system and monitor size of clusters.

Adjust charges by changing pH and/or ionic strength

Use Brownian microscopy to visualize trajectories of clusters, then predict size based on diffusion constant

Interesting Figure #1 + caption: One of 3 figures from the paper that are most relevant to addressing the main question. No more than four panels. Make sure to copy the caption(s) for these panels directly into the slide (don't paraphrase). ***Be ready to explain orally what the figure shows and why it's relevant.***

Determining Cluster Size

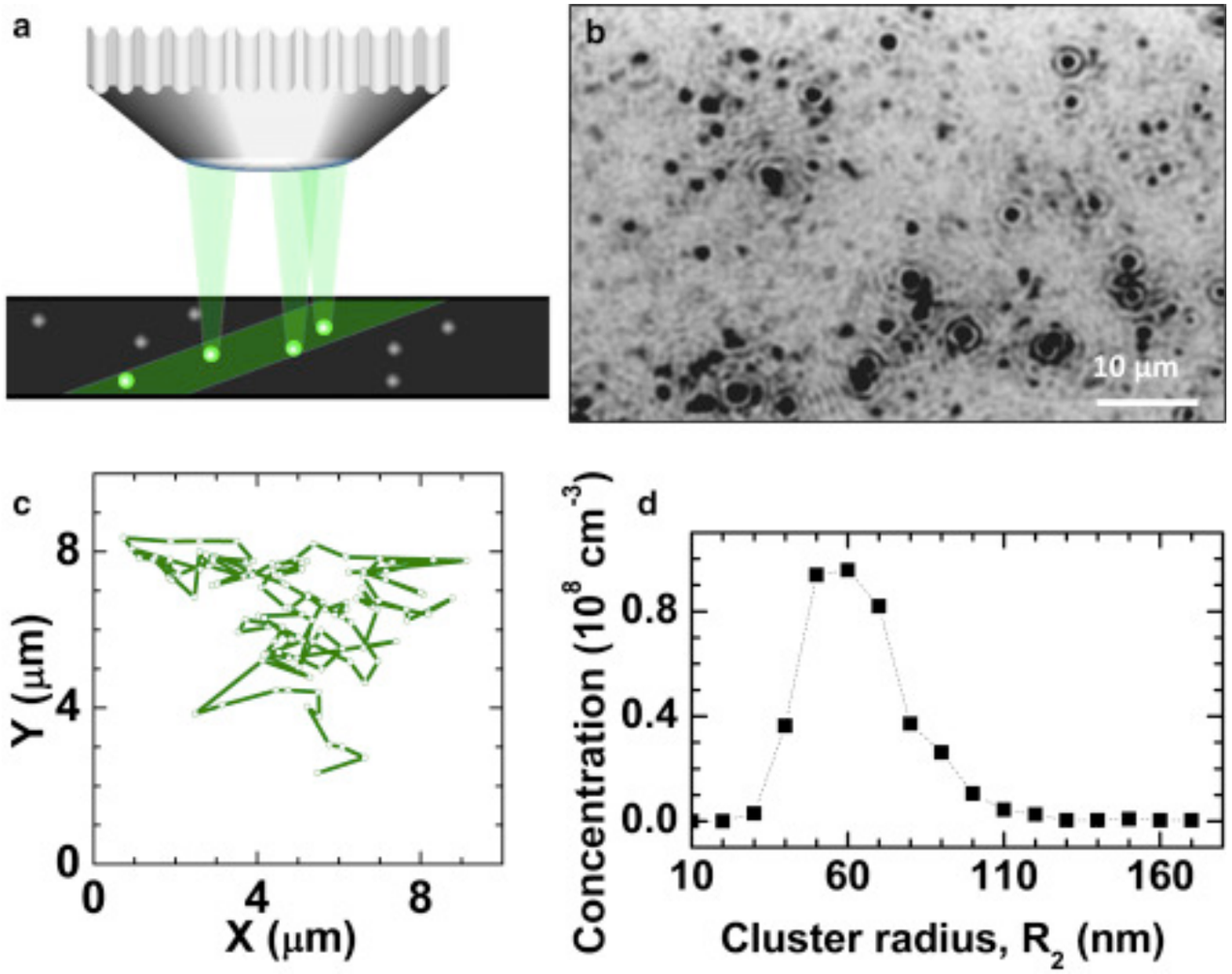


Figure 1:Cluster characterization by Brownian microscopy. (a) Schematic of the BM setup. A green laser illuminates a thin solution layer. The light scattered by particles in the solution is collected by a microscope lens. (b) A representative BM image shown as a negative. The observed volume is ~120 × 80 × 5 μm3. The clusters are seen as black spots. (c) A typical cluster trajectory determined from a sequence of images. The cluster diffusivities and sizes are evaluated from such trajectories. (d) Distribution of cluster sizes, determined from trajectories such as the one in (c). Only clusters registered for longer than 1 s are considered. To see this figure in color, go online.

Interesting Figure #2 + caption: see guidelines for IF#1

Charge doesn't affect Cluster size

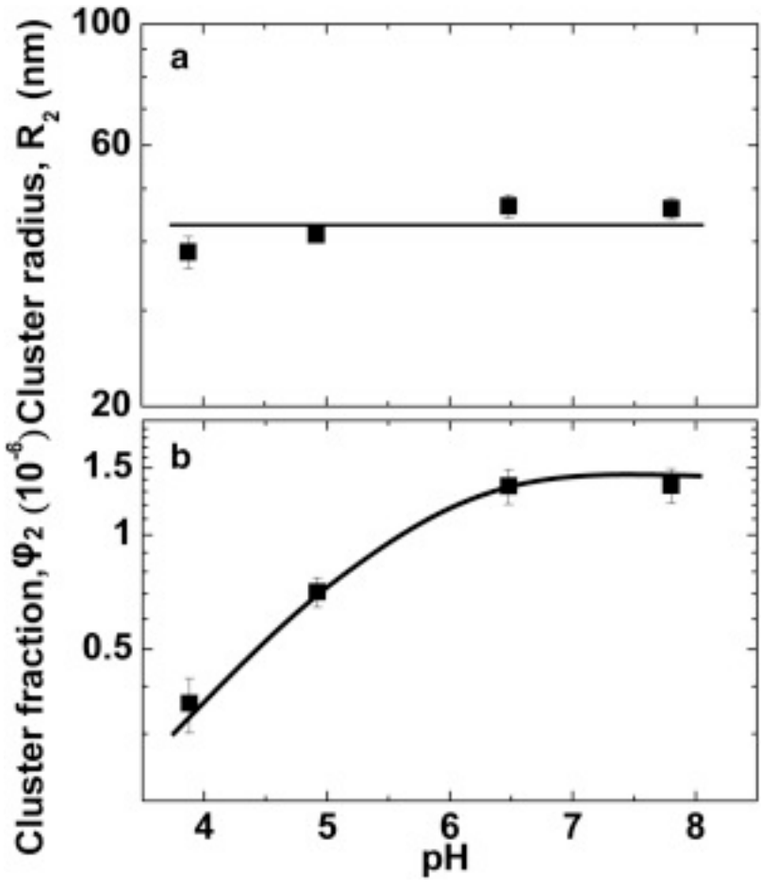


Figure 6: pH effects on the cluster characteristics, the cluster radius R2 in (a), and the cluster volume fraction ϕ2 in (b).

Interesting Figure #3 + caption: see guidelines for IF#1

Partial Unfolding does affect Cluster size

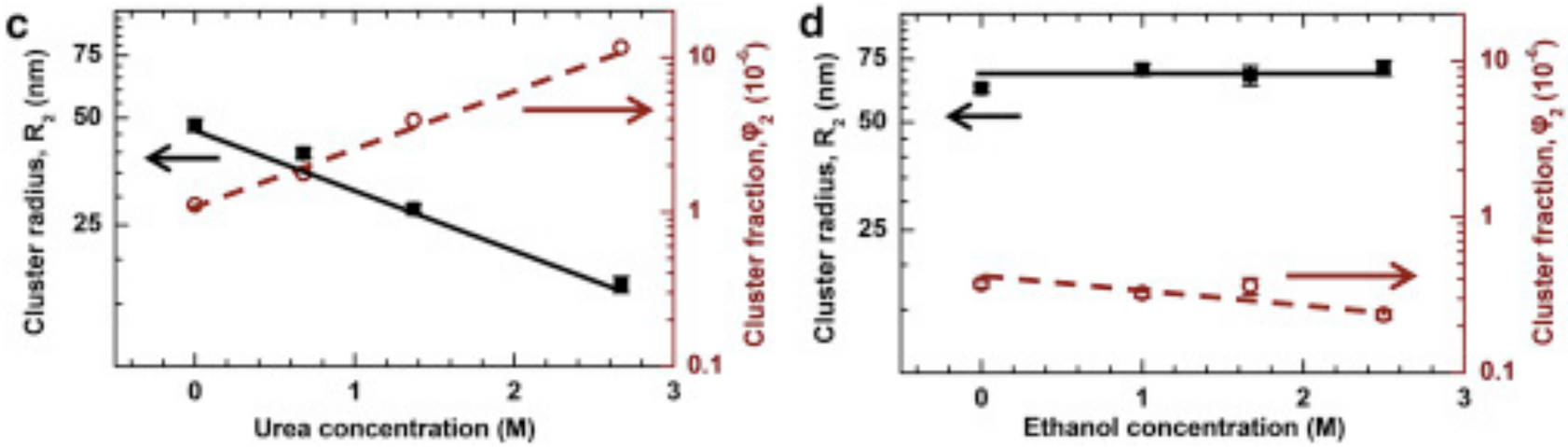


Figure 7 (c and d) The response of the cluster radius R2 (left ordinate, solid symbols) and volume fraction ϕ2 (right ordinate, open symbols) to increasing concentrations of urea and (c) and ethanol in (d).

Relevant Conclusions: 2-4 bullet points with insights the researchers gained into the 'main question'

Relevant Conclusions

- Cluster size is affected by lysozyme conformation, but **not** charge.

- Results are consistent with 'oligomer model' driven by hydrophobic effects

Impressions: 2-4 bullet points with comments on aspects of the paper you appreciated, found surprising, think could be improved, etc.

Impressions

- It would be interesting to see this study done with at least one more type of protein - maybe the results only hold for lysozyme?

- How well does relationship between diffusion and radius hold up? Is it affected by shape fluctuations of clusters?