

From: Carolyn Bradley cbradley@fsu.edu  
Subject: Feedback on NSF proposal  
Date: May 27, 2021 at 10:25 AM  
To: Bryan Quaife bquaife@fsu.edu  
Cc: Mike Mitchell mike.mitchell@fsu.edu

CB

God morning, Bryan!

Thank you so much for trusting me with your NSF proposal as well as the flurry of feedback from the review committee! I'm an English literature PhD, so I'm sure you won't be surprised to hear that the entirety of your proposal was, unfortunately, completely over my head. And yet, even as I couldn't begin to grasp your proposal's content, I can paradoxically say that I found the prose was very assured and fine! The writing flows smoothly throughout, and the sentence's syntax and connections are never tortured or difficult to understand (as is the norm for STEM proposals in my experience). 😊

Please find below my overall reflections and recommendations. Also, I have attached my marginal comments, which I just inserted directly on to the PDF via the Adobe Acrobat "Comment" tool. Good luck with your re-submit!!!! And good for you for fighting for a project you believe in. Please let me know if I can offer you any more assistance. 😊

1. It would be a good idea to have a senior faculty member in your discipline review the proposal. Let me know if you have a senior researcher in mind who might be willing to offer his/her thoughts. If not, I can help you find an appropriate person.
2. It would also be a good idea to reach out to the program contact for his/her feedback on how you can improve the proposal, especially since the reviewers' comments were mostly positive. You can find the program contact's name on the solicitation.
3. **This is quite certainly out of my area of expertise, but...** I am wondering if the "Applied Mathematics" NSF program is the best fit for this proposal. The current "Applied Mathematics" NSF proposal solicitation explains, "Proposals whose primary applications are in the biological sciences are inappropriate for Applied Mathematics, and should be submitted elsewhere" ([https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5664](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5664)). In your proposal, you indicate that the project will be "transformative in biomedicine and material science," but will also have "application in robotics, machine learning, and engineering." Meanwhile, at least one of your reviewers describes the proposal as addressing a broad class of important questions in biology, and contends that the project is possibly relevant to materials science as well. It might be worth considering if the proposal would be a stronger fit for another NSF program, such as "Mathematical Biology" ([https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5690&org=NSF](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5690&org=NSF)) or "Joint DMS/NIGMS Initiative to Support Research at the Interface of the Biological and Mathematical Sciences" ([https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5300&org=NSF](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5300&org=NSF)).
4. In your headings and subheadings, you should aim for structural parallelism—i.e., making sure to use a consistent form of speech among headings or subheadings of equal weight. So, e.g., if Section 1.1 subheading reads as a complete sentence, then Section 1.2 subheading should read as a complete sentence; if Section 4.1.1 subheading reads as a general noun, Section 1.1.2 subheading should read as a general noun, etc. For the most part, your headings and subheadings seem to maintain parallel structure, but do go through and double check that, since, again, I

maintain parallel structure, but do go through and double-check that, since, again, I often couldn't discern your intent since I don't understand the content. However, I can say that your three Specific Aims need to be revised in order to achieve parallelism. You present "Specific Aim 1" as a gerund phrase, so you might choose to just stick with that, and revise "Specific Aim 2" as, e.g., "Generating efficient, high-order methods for large-scale simulations" and "Specific Aim 3" as, e.g., "Revealing the dynamics of self-assembly by HAP under an external flow/field," etc. Personally, I would actually recommend you revise all three Specific Aims as second-person commands (e.g., "Specific Aim 1: Measure material properties of amphiphile self-assembly," etc.), since these are *aims*. Either way, these three line headings are arguably the most important lines in your entire proposal, so you want to make sure they look sharp!

5. Importantly, I think you can dramatically improve your proposal's selling power by focusing your energy on improving that opening mini-section (currently three paragraphs) under "1. Background," prior to the subsection "1.1. Hydrophobic Attraction Potential (HAP)." As the introduction to your proposal, the importance of this subsection cannot be overstated. This is your opportunity to 'hook' the reader, to insist upon the urgency of a crucial 'need' you have identified, and *then* to suggest that you have an innovative, feasible, and promising solution in mind which you will use the body of the proposal to describe. Note that it is this crucial 'need' which should be your focus here. While you might need to open the proposal with a sentence or two to establish needed context for the reader, you should very quickly be moving to explain the crucial 'need' at stake in your proposal. I would say this information should be evident no later than sentence 3. And then go on to elaborate on this need. Why is this need/problem so significant? What heavy price (real or opportunity cost) are we paying as a society because we haven't yet filled this need/resolved this problem? How would the world be improved if we were to prioritize filling this need? The more you can persuade the reader of the significance of this 'need,' the more compelling your proposal will be. (Of course, make sure to tailor your description of the 'need' to the solicitation. If the solicitation is looking for proposals only with applications related to math, focus on a 'math'-related need. If the solicitation is looking for proposals related to both math and biology, draw out how both 'math' and 'biology' are currently being held back because we haven't filled this need, etc.)

After that opening paragraph, you might have a paragraph or two to provide 'needed background' information on your proposal. What have researchers learned so far, etc? You already have most of this material.

And then that mini-section's final paragraph (the paragraph prior to subsection 1.1) should focus on introducing your proposed project. You can briefly suggest that the project will be innovative, feasible, and promising, while indicating to the reader that you will be justifying all of these claims in the body of the proposal itself. Wrap up this section by again referring to the crucial 'need,' and making a bold claim that your proposal promises to offer a solution.

6. On a related note, I actually wonder if it might be a good idea to mention your education/training program upfront in this same introductory mini-section under "1. Background," prior to subsection 1.1. **You should probably discuss this with the NSF program contact, because I'm not sure if the NSF would approve this idea or not.** However, in my opinion, you might be able to strengthen the proposal by mentioning this education/training program upfront. It would seem to belong in that mini-section's final paragraph in which I argue you should describe your project as a whole.

I have two reasons why I propose mentioning the education/training program early on. To begin, the program seems important to the proposal overall (even if it is admittedly not a Specific Aim), so mentioning it in this general introductory section seems necessary to provide a comprehensive overview. For another thing, this will allow you to get ahead of reviewers' complaints that the

another thing, this will allow you to get ahead of reviewers' complaints that the proposal lacks a diversity focus. Your reviewers expressed concern about that issue, but in fact, since your program is designed to recruit students from underrepresented minority and/or underprivileged socioeconomic backgrounds, the project actually has a built-in diversity focus. By mentioning the education/training program early on (and of course simultaneously mentioning the plan to recruit students from underrepresented minority and/or underprivileged socioeconomic backgrounds), you can help your readers see that the education program isn't merely a method for accomplishing a larger goal; it is part of the larger goal itself.

Importantly, you will again want to highlight the crucial 'need' your project will be filling with the education/training program. Why is it so urgent that we educate/train underrepresented minority and/or lower-income students in STEM? What costs are we currently paying—or will pay—for not meeting this crucial 'need'? (It strikes me that the term "minority" is tricky here, since some minorities are well-represented in STEM, but African Americans and Hispanics certainly are not.)

Sincerely,

Carolyn Bradley, PhD  
Proposal Development and Funding Specialist  
Office of Research Development  
Florida State University



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proposal.pdf