NATIONAL SCIENCE FOUNDATION
4201 Wilson Blvd. Arlington, VA 22230

NSF 08-062

Dear Colleague:

Proposals received by the National Science Foundation are evaluated based on two merit review criteria**:** intellectual merit and **broader impacts**. Through its merit review process, NSF ensures that proposals submitted are reviewed in a fair, competitive, transparent, and in-depth manner.

Proposals submitted by Principal Investigators (PIs) are reviewed based on the first criterion, intellectual merit, with the expectation that the research be high quality, innovative and advance the frontiers of science. NSF asks reviewers to consider the following in evaluating intellectual merit.

- Potential of the Research to Advance Knowledge and Understanding
- Originality, Creativity and the Potentially Transformative Nature of the Proposal
- Qualifications of Researchers
- Organization and Conceptual Foundation of the Proposed Activities
- Access to Resources Needed

The **broader impacts** criterion identifies the important outcomes and consequences of NSF-supported research. Research supported by the Division of Materials Research (DMR) is particularly well suited to demonstrate these impacts in ways visible to scientists and engineers as well as the general public. *This message is meant to clarify what is meant by **broader impacts** and how it is applied by Program Directors in making their final decisions.*

The NSF Grant Proposal Guide (Chapter III, Section A) poses five questions that identify the general areas in which **broader impacts** (Merit Review Broader Impacts Criterion: Representative Activities) typically occur. Some examples that illustrate contributions in each of the five areas are given below. Proposals need not address all of these areas, and PIs are advised to focus on those areas in which they are well prepared to make meaningful contributions.

Advance discovery and understanding while promoting teaching, training, and learning with innovative connections of research and education. Activities that go beyond the norm in conjunction with training of graduate students, mentoring postdoctoral researchers and junior faculty are highly encouraged. PIs are expected to go beyond their normal teaching duties and faculty commitments, and create opportunities that engage, excite, recruit and retain students at all levels by connecting research in materials to the many facets of education. They should seek opportunities to involve undergraduate and high school students in research experiences, participate in the professional development of K-12 teachers for whom research activities can often contribute to updating the K-12 curriculum and take the form of new classroom instructional materials and experiments.

Broadening participation of underrepresented groups by involving members of underrepresented groups (women, African Americans, American Indians including Native Alaskans, Hispanics, Native Pacific Islanders, and persons with disabilities) in research and education activities at all levels. DMR is very interested in increasing the pool of future talented educators and promising researchers. Efforts are needed to broaden participation at all levels from students through faculty members. Mentoring and outreach to junior faculty, women, and minorities used as avenues for increasing professional opportunities for groups that are underrepresented in science and engineering are highly encouraged. Establishing collaborations with students and faculty from institutions and organizations serving women, minorities, and people with disabilities in the materials, chemical, and physical sciences is crucial for increasing the pool of qualified material scientists. Initiating or participating in the development of a diversity strategic plan within the proposer's academic department is another approach to achieving this goal. DMR has provided a website to assist PIs in their endeavors to create a welcoming, nurturing, effective learning and creative atmosphere for all scientists: Broadening Participation for Greater Diversity.

Enhance infrastructure for research and education by linking with scientists and programs to bring added value and enhance impacts of research activities. The forms this may take are numerous, such as establishing research collaborations with industry, national laboratories, and international institutions; developing new instrumentation, software, computation or data analysis methodologies that have wide range of applicability and use; providing samples of novel materials to other groups; sharing advanced laboratory or computational methods, instrumentation and software; building national and international research and education networks. Advances in networking and cyber infrastructure give researchers novel ways and new opportunities for collaboration, for conducting research and education, and sharing their work.

Broaden dissemination to enhance scientific and technological understanding by organizing materials research and education workshops and symposia; forging links to other scientific disciplines; writing scholarly articles that go beyond routine publication of research results for specialists or that are addressed specifically to non-specialist audiences; sharing of data that might not otherwise be easily accessible; working with science centers on new materials research and education exhibits; assisting journalists with their stories on technical topics; and developing new art forms for communicating materials research to wider audiences; creating materials research related websites enhanced by engaging animations and movies to educate non-scientists and the public at large.

Provide benefits to society by communicating to the public the excitement, benefits, and long term impacts of materials research and enhance public appreciation of the relevance of advanced materials research to the future and society. Emphasis should be wherever and whenever appropriate on technological advances that will profit our economy, benefit our health and increase our national security. Benefits may be specific, such as creating the scientific basis for start-up companies that employ new materials research technologies or generally enhancing the knowledge base for future devices. Fundamental materials research is often ripe for technology transfer, and researchers can participate in establishing strong partnerships with industry and developing easy mechanisms for transforming fundamental research findings into useful and practical applications.

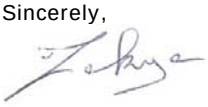
Because materials research yields so many results of direct and obvious importance to other disciplines and society, the materials community is in a strong position to demonstrate as much creativity and originality in the **broader impacts** as it does in the intellectual merit of its NSF proposals. In making final decisions with respect to awards NSF program directors give careful consideration to the extent that proposals address the NSF goals of *Integration of Research and Education* and *Integration of Diversity into NSF Programs, Projects, and Activities*. PIs are encouraged to recognize these NSF objectives as they prepare proposals for consideration by DMR.

Both intellectual merit and **broader impacts** must be addressed in clear and explicit fashion in the Project Summary of every proposal, and the Project Description must expand upon the details of both criteria. PI capability (including track record when applicable), a realistic plan for implementation, as well as identifiable results enter into the assessment by the reviewers and NSF program officers. We wish also to mention that a distinction needs to be made between broader impacts specific to a given proposal and synergistic activities which are carried out whether or not the proposal gets funded.

In light of NSF's commitment to the **broader impacts** criterion, the proposer(s) should carefully consider ways to incorporate rigorous, meaningful and innovative **broader impacts** activities (e.g., broadening participation) that integrate with the research being proposed. It is expected that project activities related to **broader impacts** will be of the same caliber as those addressing the intellectual merit criterion. Contributions to **broader impacts** should be based on good scholarship, and be designed to achieve clearly stated goals and metrics, while possessing the appropriate expertise and resources available for implementation.

I hope that this information provides helpful guidance, clarifies what is meant by the "**broader impacts**" criterion and how it is applied by program directors in making their final decisions. For further information regarding broader impacts, see the NSF July 2007 document: *Merit Review Broader Impacts Criterion: Representative Activities.* Feel free to contact DMR program directors, if you would like to discuss the broader impacts associated with your project.

Sincerely,



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