

## NSF GUIDELINES FOR PROJECT NARRATIVE SECTION “RESULTS FROM PRIOR NSF SUPPORT”

The purpose of this section is to assist reviewers in assessing the quality of prior work conducted with current or prior NSF funding. If **any PI or co-PI identified on the proposal** has received NSF support with an award date in the past five years (including any current funding and no-cost extensions), information on the award is required for each PI and Co-PI, regardless of whether the support was directly related to the proposal or not.

In cases where the PI or co-PI has received **more than one award** (excluding amendments to existing awards), they need **only** to report on the one award most closely related to the proposal. Support includes not just salary support, but any funding awarded by NSF. NSF awards such as standard or continuing grants, Graduate Research Fellowship, Major Research Instrumentation, travel, conference, and center awards, etc., are subject to this requirement.

**All of the following information must be provided:**

- a. The NSF award number, amount and period of support.
- b. The title of the project.
- c. A summary of the results of the completed work, including accomplishments, supported by the award. **The results must be separately described under two distinct headings: Intellectual Merit and Broader Impacts.**
- d. A listing of the publications resulting from the NSF award (a complete bibliographic citation for each publication must be provided either in this section or in the References Cited section of the proposal); if none, state “No publications were produced under this award.”
- e. Evidence of research products and their availability, including, but not limited to: data, publications, samples, physical collections, software, and models, as described in any Data Management Plan.
- f. If the proposal is for renewed support, a description of the relation of the completed work to the proposed work.

**If the project was recently awarded and therefore no new results exist**, describe the major goals and broader impacts of the project. Note that the proposal may contain up to five pages to describe the results. Results may be summarized in fewer than five pages, which would give the balance of the 15 pages for the Project Description.

## VII. RESULTS OF PRIOR NSF SUPPORT

<b>1. NAME OF PI, James Madison University</b>				
<b>NSF Grant Number and Title</b>	<b>Duration/ Award</b>	<b>Papers</b>	<b>Students Supported</b>	<b>Achievements</b>
0710981: RET SITE: Milwaukee Regional Energy Education Initiative	08/01/11-07/31/14  \$374,601	1 paper published (see References section) and one paper in preparation	2 graduate students  6 REUs	Develop research and education programs in energy sciences and engineering within MPS by taking advantage of existing interdisciplinary research collaborations among Milwaukee's three colleges of engineering

**A. Intellectual Merit:** Research topics for the RET participants include renewable and alternative energy, nanoscale sensor development, advanced materials, wind turbine blade design, and carbon capture and sequestration. The teachers will be linked with real-world applications through collaborations with industry partners.

**B. Broader Impact:** The RET Site directly impacts 30 teachers and 2,000 students from high-need urban public high schools in the city of Milwaukee. To ensure its success, the program will be evaluated in quantitative terms of participation and in terms of the impact on students' knowledge and interest in engineering careers and their mastery of core science concepts.

## 12. Prior NSF Support

James Madison University				
NSF Grant Number and Title	Duration /Award	Papers	Students Supported	Achievements
<b>Pradeep Rohatgi, Principal Investigator</b>				
0710981:US-Egypt: Lightweight Lead Calcium Alloy-Fly Ash Microballoon Composites for Automotive Batteries Operating Under High Temperature	08/01/07-07/31/11 \$30,000	1 paper published (see Reference section) and one paper in preparation	2 Graduate Students 6 REUs	Synthesized and characterized lead, lead-calcium and lead-aluminum alloy composites reinforced with fly ash microballoons

**A. Intellectual Merit:** We optimized process parameters syntheses of lead fly-ash cenosphere composites with high volume fractions of hollow microballoons. It also characterized solidification microstructures formed during pressure infiltration syntheses of these alloys and measured selected mechanical and physical properties. The resulting publication is: A. Daoud, M.T. Abou El-Khair, A.Y. Shenouda, E. Mohammed, P.K. Rohatgi, Microstructure, tensile properties and electrochemical behavior of Pb alloy–45 vol.% fly ash microballoon composites, *Materials Science and Engineering A* 526 (2009) 225–234.

**B. Broader Impact:** This research can lead to (a) light weight lead acid batteries since the density of lead-cenosphere fly-ash composites is about half that of lead. (b) Lighter x-ray shielding components for industry. The knowledge base generated on pressure infiltration syntheses can be applicable to syntheses of other composites and syntactic foams by industry. Johnson Controls Inc., the largest lead acid battery manufacturer in the U.S., is aware of our results and has expressed interest in this work. The findings of this project were incorporated in the course “Engineering Composites.” During this course, the students toured the UWM Composites Center and saw the equipment used and samples of lead-fly ash composites made in the project. The samples of lead 60 vol.% fly ash cenosphere made in this project have been sent to our NSF collaborators in Egypt for characterization of the structure and additional properties. The samples have also been sent to NYU for characterization of high strain rate behavior of lead fly ash syntactic foams. The lighter weight lead fly ash composites made in the project are on display in the UWM Composites Center and are shown to visitors and students who tour the laboratory, including high school students who take the tour during the annual open house for prospective students.