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9/27/23

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MTSU Clean Energy Initiative Project Funding Request

There are five (5) sections of the request to complete before submitting. See <http://www.mtsu.edu/sga/cleanenergy.shtml> for funding guidelines. Save completed form and email to cee@mtsu.edu or mail to MTSU Box 57.

1. General Information	
Name of Person Submitting Request Scott Handy	
Department/Office Chemistry	Phone # (Office) 615-904-8114
MTSU Box # 68	Phone # (Cell)
E-mail shandy@mtsu.edu	Submittal Date

2. Project Categories (Select One)	
Select the category that best describes the project.	
<input type="checkbox"/> Energy Conservation/Efficiency	<input type="checkbox"/> Sustainable Design
<input type="checkbox"/> Alternative Fuels	<input checked="" type="checkbox"/> Other
<input type="checkbox"/> Renewable Energy	

3. Project Information
<p>a. Please provide a brief descriptive title for the project.</p> <p>b. The project cost estimate is the expected cost of the project to be considered by the committee for approval, which may differ from the total project cost in the case of matching funding opportunities. Any funding request is a 'not-to-exceed' amount. Any proposed expenditure above the requested amount will require a resubmission.</p> <p>c. List the source of project cost estimates.</p> <p>d. Provide a brief explanation in response to question regarding previous funding.</p>
3a. Project Title A Cleaner Method to Generate Organometallics Directly from Alcohols
3b. Project Cost Estimate \$1861
3c. Source of Estimate Strem, Cambridge Isotope, and Fisher Scientific catalogs
3d. If previous funding from this source was awarded, explain how this request differs? Prior funding (many years ago) was for a solar energy project, while this project is focused on greener (and cleaner) synthesis

4. Project Description

(Completed in as much detail as possible.)

- a. The scope of the work to be accomplished is a detailed description of project activities.
- b. The benefit statement describes the advantages of the project as relates to the selected project category.
- c. The location of the project includes the name of the building, department, and/or specific location of where the project will be conducted on campus.
- d. List any departments you anticipate to be involved. Were any departments consulted in preparation of this request? Who? A listing may be attached to this form when submitted.
- e. Provide specific information on anticipated student involvement or benefit.
- f. Provide information for anticipated future operating and/or maintenance requirements occurring as a result of the proposed project.
- g. Provide any additional comments or information that may be pertinent to approval of the project funding request.

4a. Scope: Work to be accomplished

Carbon-carbon formation is a core method in Organic synthesis. Usually this is done starting from organic halide, but these compounds are frequently not stable, are not natural, and can be expensive. They are most often prepared from alcohols, so using the alcohols directly will avoid the waste generated in their conversion to halide. Further, alcohols are frequently found in nature, are much more stable, and much less expensive. We have discovered an initial set of reaction conditions that enable the use of alcohols, but need to gather more preliminary data on the importance of ligands prior to seeking external funding. It is the purchase of these ligands that is sought in this proposal.

4b. Scope: Benefit Statement

Carbon-carbon bond formation is a core method in Organic synthesis. It is a fundamental reaction that is used a great deal in the synthesis of organic products (pharmaceutical and materials). Using alcohols in place of halides will serve to reduce cost, will increase the range of the reaction due to the increased stability of alcohols compared to halide. It will also generate a less hazardous by product (water instead of acidic HX). It will be catalytic using a base metal and not a precious metal and the reaction is also tolerant of water and oxygen unlike existing options. Taken together, this will result in a much safer reaction.

4. Project Description (continued)
4c. Location of Project (Building, etc.) SCI 3021
4d. Participants and Roles Scott Handy – PI, directing and training students involved Ben Matthews – undergraduate conducting experiments and assisting with less experienced researchers Jozeph Abdelmasah – undergraduate conducting experiments Zoe Johnson - undergraduate conducting experiments
4e. Student participation and/or student benefit The undergraduates involved in this project will conduct the bulk of the synthetic effort and thus learn basic synthetic techniques which is a strong preparation either for graduate school or for employment in industry. They will also learn unusual aspects of assessing the environmental impact of reaction conditions and how to methodically explore reaction variables
4f. Future Operating and/or Maintenance Requirements none
4g. Additional Comments or Information Pertinent to the Proposed Project Future funding of this work will be sought from external sources based upon the preliminary results from this support.

5. Project Performance Information
Provide information if applicable. a. Provide information on estimated annual energy savings stated in units such as kW, kWh, Btu, gallons, etc. b. Provide information on estimated annual energy cost savings in monetary terms. c. Provide information on any annual operating or other cost savings in monetary terms. Be specific. d. Provide information about any matching or supplementary funding opportunities that are available. Identify all sources and explain.
5a. Estimated Annual Energy Savings (Estimated in kW, kWh, Btu, etc.) NA
5b. Annual Energy COST Savings (\$) NA
5c. Annual Operating or Other Cost Savings. Specify. (\$) NA
5d. Matching or Supplementary Funding (Identify and Explain) Any additional materials required are currently available in the PI's lab and/or the Chemistry department

Materials List

Fisher Scientific

DMF 4L AC2796000401 \$431

Cambridge Isotope Labs

d6-DMSO 100g DLM-10-100 \$426

Strem Chemical

Dipyridyl 25g 07-0290 \$96

Phenanthrene 25g 07-1650 \$192

BINAP 5g 15-3144 \$118

BINOL 5g 08-0999 \$37

BOX 250mg 07-0003 \$76

PhOX 250mg 15-1821 \$356

PyBOX 1g 07-1363 \$134

PyrOx 100mg 07-1084 \$95

Total \$1861

Linda Hardymon

From: Scott Handy
Sent: Wednesday, September 27, 2023 1:39 PM
To: Center for Energy Efficiency
Subject: grant submission
Attachments: clean energy submission.pdf

Attached you should find my application for funding through the Clean Energy Fee. Should you have any questions, please feel free to contact me. Thank you for your time and consideration.

Scott

Scott T. Handy
Professor of Chemistry
Middle Tennessee State University
Murfreesboro, TN 37132