Rec 9/30/13 (2)

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 Dr. Keying Ding	
Department/Office Department of Chemistry	Phone # (Office) 615-898-2475
MTSU Box # 68	Phone # (Cell) 612-961-4048
E-mail Keying.Ding@mtsu.edu	Submittal Date 09/30/2013

2. Project Categories (Select One)			
Select the category that best describes the project.			
☐	Energy Conservation/Efficiency	☑	Sustainable Design
☐	Alternative Fuels	☐	Other
☐	Renewable Energy		

3. Project Information

a. Please provide a brief descriptive title for the project.
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.**
c. List the source of project cost estimates.
d. Provide a brief explanation in response to question regarding previous funding.

3a. Project Title
"Bring Green Chemistry to MTSU" - Project One: A Sustainable Route to Styrene from Cinnamaldehyde by Earth-abundant Metal Catalysts: Design, Synthesis and Characterization of Ligands and Metal Complexes

3b. Project Cost Estimate
$1967 for chemicals (itemized costs on request)

3c. Source of Estimate
Strem Chemicals, Inc.

3d. If previous funding from this source was awarded, explain how this request differs?
N/A

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

Styrene is an important chemical that is widely used as monomer of polystyrene and its copolymers. In industry, styrene is mainly synthesized from conventional non-sustainable petroleum source. To make styrene from alternative renewable biofeedstock is attractive but challenging, and the catalysts in use are generally derived from rare precious metals, which are non-sustainable either. Herein, we propose a new, sustainable route to styrene by earth-abundant base metal catalysts from cinnamaldehyde, an essential oil extracted from natural cinnamon bark.

The basic idea is to first build up a library of ligands and complexes with earth-abundant first-row transition metals like Fe, Co, Ni, etc., then by using high throughput screening, a method for quick catalyst discovery, metal complexes with catalytic reactivities will be identified, which will lead to further in-depth mechanistic studies of the reaction at the molecular level and allow for development of new catalyst models for styrene derivation.

Specifically, in this sub-project we will design, synthesize and characterize a series of ligands and metal complexes and make a library ready for catalyst screening.

4b. Scope: Benefit Statement

Presently, we need results from catalyst synthesis and characterization, which will serve as preliminary data for major external funding from NSF and/or DOE for further study. The results will also be adapted as part of the experimental section to a "Green Chemistry" course at MTSU which is currently under design. This research will ultimately contribute to a proposed program "Bring Green Chemistry to MTSU" that includes activities of research, education, collaboration and public outreach, aiming to develop new sustainable technology and educate the next generation of researchers within the MTSU community.

4. Project Description (continued)

4c. Location of Project (Building, etc.)

Wiser-Patten Science Hall

4d. Participants and Roles

Dr. Keying Ding (PI) - conduct experiments; supervise students

One graduate student - conduct experiments; supervise undergraduate student

One undergraduate student - assist in lab

This project is supported by Department of Chemistry at MTSU. Undergraduate student is financially supported by MTSU Undergraduate Research Experience and Creative Activity (URECA) Assistant Award. Graduate student is supported by Graduate Teaching Assistantship.

4e. Student participation and/or student benefit

Students will not only learn basic concepts of green and sustainable chemistry but also get hands-on research experiences in this field. We hope that through our proposed "Bring Green Chemistry to MTSU" program, more MTSU students will be involved and get to learn green chemistry, which will ultimately benefit our MTSU community.

4f. Future Operating and/or Maintenance Requirements

See 4a and 4b.

4g. Additional Comments or Information Pertinent to the Proposed Project

Results from this research will serve as (a) preliminary data for major external funding applications through DOE and/or NSF; (b) part of the laboratory section for a new under-construction course - "Green Chemistry" at MTSU.

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.)

N/A

5b. Annual Energy COST Savings ($)

N/A

5c. Annual Operating or Other Cost Savings. Specify. ($)

N/A

5d.Matching or Supplementary Funding (Identify and Explain)

N/A

Linda Hardymon

From: Keying Ding
Sent: Monday, September 30, 2013 7:52 AM
To: Center for Energy Efficiency
Subject: Clean Energy Fee Funding proposal
Attachments: Clean Energy Project Funding Request.Keying.pdf

MTSU Clean Energy Initiative Committee,

This is Keying Ding, a faculty member of Department of Chemistry. Here is my applications to the Clean Energy Fee Funding. If there is anything missing in the applications or anything that you concern, please do not hesitate to let me know.

I really appreciate your help!

Sincerely,

Keying

Keying Ding

Assistant Professor
Department of Chemistry
Middle Tennessee State University
Murfreesboro, TN 37132