

Rec 10/5/18

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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 <u>Beng Guat Ooi</u>	
Department/Office SCI 3081	Phone # (Office) 615-898-2076
MTSU Box # Box 68, MTSU Chemistry	Phone # (Cell) 615-918-0945
E-mail bgooi@mtsu.edu	Submittal Date 10/5/2018

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 checked="" type="checkbox"/> Alternative Fuels	<input checked="" type="checkbox"/> Other (Research)
<input type="checkbox"/> Renewable Energy	

3. Project Information
<ul style="list-style-type: none"> 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 <u>Conversion of Discarded Oyster Shells into a Catalyst for Making Biofuels</u>
3b. Project Cost Estimate <u>Aeroqual 300 sensors (\$1200.00) from Gas-Sensing and various sampling accessories are available at Amazon.com website (\$2700)</u>
3c. Source of Estimate http://www.gas-sensing.com/portable-monitors/aeroqual-series-300.html http://www.restek.com/Sample-Handling/Air-Sampling/Canisters-Accessories

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

This study examines the emission profiles from biodiesel produced with different catalysts made from shells of oyster, mussels, and lobster. Emission samples from the generators were collected directly into Tedlar bags and were analyzed by gas chromatography-mass spectrometry (GC-MS) and extractive Fourier Transform infrared (FTIR) spectrometry. Furthermore, sensors for giving instantaneous readings of formaldehyde, methane, ozone, and nitrogen dioxides in the emissions will also be used to collect these complementary data.

The use of different shells in producing biodiesel is expected to yield differences in fuel composition. Therefore, it is necessary to probe the emission profiles by doing comprehensive analysis of multiple pollutants in the emissions. The detailed analysis of VOCs in the engine emissions by GC-MS and FTIR allows different fuel formulations to be correlated with the emission levels of specific toxicants including those compounds that have been classified as suspected or known human carcinogens. Furthermore, sulfur dioxide and inhalable particulate matter will be measured.

4b. Scope: Benefit Statement

The success of this project will allow the identification of oxygenated fuel additives that can be added to transportation fuels for reducing volatile organic compounds (VOCs), sulfur dioxide, inhalable fine particulate matter, and carbon monoxide in exhaust emissions of vehicles. This will also lead to reduction in the emission of harmful air pollutants by smaller engines such as power generators, lawn mowers, jet skis, construction equipment, and snowmobiles. Consequently, the public will benefit from the improvement in the air quality that has lower levels of air pollution. The sensitive population of children and the elderly will have a lower incidence of respiratory illnesses such as asthma and chronic obstructive pulmonary diseases (COPD).

4. Project Description (continued)

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

Science Room 3080

4d. Participants and Roles

Beng Guat Ooi: Purchase and installation of the sensors for emission testing; using instrumentation devices in teaching and research; evaluating the catalyst structures derived from shells.

Research students: Carrying out the procedures for converting shells into catalysts as well as gaining a greater understanding the emission testing program at MTSU.

4e. Student participation and/or student benefit

Students will have the opportunities for learning the use of techniques such as GC-MS, FTIR, and various sensors for measuring different types of pollutants released from engines fueled with diesel or gasoline. This research may also to develop laboratory skills that will help them get jobs in chemical industry and to continue as a research in graduate schools.

4f. Future Operating and/or Maintenance Requirements

The Department of Chemistry will provide funds to cover the research expenditures of students for supplies needed for GC-MS and FTIR. The maintenance of the equipment for research will be available in the department since a full-time instrument support engineer is available.

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

The list of sensors for Aeroqual analyzer is shown in the attachment.

5. Project Performance Information
<p>Provide information if applicable.</p> <ol style="list-style-type: none"> Provide information on estimated annual energy savings stated in units such as kW, kWh, Btu, gallons, etc. Provide information on estimated annual energy cost savings in monetary terms. Provide information on any annual operating or other cost savings in monetary terms. Be specific. Provide information about any matching or supplementary funding opportunities that are available. Identify all sources and explain.
<p>5a. Estimated Annual Energy Savings (Estimated in kW, kWh, Btu, etc.)</p> <p>Not applicable.</p>
<p>5b. Annual Energy COST Savings (\$)</p> <p>Not applicable.</p>
<p>5c. Annual Operating or Other Cost Savings. Specify. (\$)</p> <p>Not applicable.</p>
<p>5d. Matching or Supplementary Funding (Identify and Explain)</p> <p>The Department of Chemistry will pay for the annual operating cost of about \$2000 per year. I already have other equipment items for my biofuel research project and so no other expenses are anticipated besides the annual operating cost and the cost of purchasing the ultrasonic device.</p>

AEROQUAL SERIES 300 MONITOR (S-300) WITH SENSOR HEAD



The Aeroqual Series 300 allows portable monitoring and a single package. When stationary, the Series 300 has re voltage outputs that can interface with your dataloggers systems. When on the move, the rechargeable battery g hours of safety monitoring that you can take with you.

Sensor Head *

* Req

Choose an Option...

Choose an Option...

- Ammonia 0-100 ppm (ENG) +\$165.00
- Ammonia 0-1000 ppm (NH) +\$10.00
- Carbon Monoxide 0-25 ppm (ECM) +\$10.00
- Carbon Monoxide 0-100 ppm (ECN) +\$10.00
- Carbon Monoxide 0-1000 ppm (CO) +\$10.00
- Carbon Dioxide 0-2000 ppm (CD) +\$165.00
- Carbon Dioxide 0-5000 ppm (CE) +\$165.00
- Chlorine 0-10 ppm (ECL) +\$10.00
- Formaldehyde 0-10 ppm (EF) +\$165.00
- Hydrogen 0-5000 ppm (HA) +\$10.00
- Methane 0-10000 ppm (MT) +\$10.00
- Hydrogen Sulfide 0-10 ppm (EHS) +\$10.00
- Hydrogen Sulfide 0-100 ppm (EHT) +\$10.00
- Nitrogen Dioxide 0-1 ppm (ENW)
- NMHC 0-25 ppm (VN) +\$10.00
- Ozone 0-10 ppm (EOZ)
- Ozone 0-0.5 ppm (OZL)
- Ozone 0-0.15 ppm (OZU) +\$40.00
- Ozone 0-0.05 ppm (OZS) +\$150.00

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