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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/sqa/cleanenergy.shtml> for funding guidelines. Save completed form and email to [cee@mtsu.edu](mailto:cee@mtsu.edu) or mail to MTSU Box 57.

<b>1. General Information</b>	
Name of Person Submitting Request Beng Guat Ooi	
Department/Office SCI 3081	Phone # (Office) 615-898-2076
MTSU Box # Box 68, MTSU Chemistry	Phone # (Cell) 615-918-0945
E-mail <a href="mailto:bgooi@mtsu.edu">bgooi@mtsu.edu</a>	Submittal Date 10/6/2017

<b>2. Project Categories (Select One)</b>			
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		

<b>3. Project Information</b>
<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. <b>Any funding request is a 'not-to-exceed' amount. Any proposed expenditure above the requested amount will require a resubmission.</b></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 <u>Comparing the Pollutant Emissions for Various Alternative Fuels</u>
3b. Project Cost Estimate <u>Deployable Particulate Sampler System (\$4799.00) and sulfur dioxide analyzer (\$1145) for a total request of \$ 5,944</u>
3c. Source of Estimate <u>Quote from SKC Inc, vendor for particulate sampler is at the weblink below.</u> <u><a href="http://www.skcinco.com/catalog/product_info.php?cPath=100000000_102000_102000100_102000101&amp;products_id=10">http://www.skcinco.com/catalog/product_info.php?cPath=100000000_102000_102000100_102000101&amp;products_id=10</a></u>

#### 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 electric power generators fueled by various oxygenated additives in diesel and gasoline. 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. The emission results based on GC-MS and FTIR were obtained for diesel blended with bis(2-methoxyethyl) ether or diglyme and triethylene glycol dimethyl ether or triglyme.

The alternative fuels consist of oxygenate additives including ethanol, n-butanol, triacetin, and 2-methyltetrahydrofuran were blended with gasoline for evaluation. Emissions were monitored at the blending levels of 2%, 4%, and 6% oxygen by weight for gasoline additives and at 4% (w/w) of diglyme and triglyme for diesel. 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 particulate sampler and the sulfur dioxide analyzer; using instrumentation devices in teaching and research; evaluating the accuracy of both measurement devices for the determination of particulate matter and SO<sub>2</sub> in engine emissions.

Research students: Learn to use the particulate sampler and SO<sub>2</sub> analyzer 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, SO<sub>2</sub> analyzer, and particulate sampler 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 quotes for the requested equipment are attached with this proposal.

### 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.)

Not applicable.

#### 5b. Annual Energy COST Savings (\$)

Not applicable.

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

Not applicable.

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

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.



# Shenzhen YuanTe Technology Co., Ltd.


Tel: 86-755-26722929-607 Fax: 86-755-85258143 Web: www.szyuante.com

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To:  
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QS No.: QS170907SH  
Date: 7th Sep., 2017  
Contact: Ms Sharon Huang  
Email: szyuante@hotmail.com  
Currency: USD  
Page: 1 of 1

## Quotation Sheet

No.	Model	Picture	Specification	Packing	Q'ty (pcs)	Unit Pri (pc)
1	SKY2000-SO2 (with PC software)		<b>Portable SO2 gas detector (high precision)</b> 1. Principle: Electrochemistry 2. <b>Measure range: 0-20ppm</b> 3. <b>Resolution: 0.01ppm</b> 4. Alarm with sound, light and vibration, alarm point is settable 5. Large capacity of lithium polymer battery 6. <b>Detect the SO2 gas concentration in the air</b> 7. Internal sampling pump, fast and accurate 8. Chinese/English language 9. Dimension: 205*75*32mm Weight: 300g 10. Working temperature: -20~50C, Humidity: 0-90%RH 11. <b>With data storage function, historical data can be read on the detector and can be downloaded by connecting to computer through USB port. (computer</b>	1pc/box	1	US\$1100/pc
2	Delivery cost by DHL (1pc)					US\$45

### Remarks:

1. Term: Deliver to the USA by DHL
2. Payment Term: T/T in advance
3. Delivery: 3 days
4. Packing: Standard export cartons or according to customer requirements
5. Valid: 30days

Aluminum case:



For and on behalf of

**Shenzhen YuanTe Technology Co., Ltd.**

*Sharon*

(Sharon Huang)

### Company Information

深圳市元特科技有限公司

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