

Investigations of e-fuels at cold temperatures

Relevance to the Automotive Industry:	Electrofuels (E-fuels) are increasingly becoming the focus of attention to achieve climate goals. These are drop-in replacement fuels that are produced from renewable energy, so they enable a climate neutral operation of combustion engines. Their composition can furthermore be optimized for particulate emission reduction, which is of particular interest during engine cold-start conditions because engine cold starts have always been critical in terms of pollutant emissions. For this NSF REU project, an OME e-fuel will be investigated under this challenging boundary condition.	
Research Location:	Technische Universität Darmstadt Institute for Internal Combustion Engines and Powertrain Systems (VKM)	
Homepage (Engl.):	http://www.vkm.tu-darmstadt.de	
Faculty Mentor:	Prof. Dr. techn. Christian Beidl	
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Graduate Mentors:	Daniel Schade, M.Sc.	
Graduate Mentor Emails:	schade@vkm.tu-darmstadt.de	
Project Description:	<p>The Technische Universität Darmstadt Institute for Internal Combustion Engines and Powertrain Systems (VKM) is participating in research on e-fuels. The target is to demonstrate this pathway of sustainable vehicle operation with potentially reduced pollutant emissions.</p> <p>This NSF REU project will be concerned with the emission behavior of the e-fuel oxymethylene ether (OME) on an internal combustion engine at cold temperatures. This will be investigated on a test bench. The objective for the NSF REU student is to compare and evaluate the particulate emission behaviors of OME and conventional fuel. This will include implementation and measurement on the test bench.</p> <p>PHASE A (2 weeks): First, the NSF REU student will review relevant research; investigate existing software and hardware, and detail and distribute project responsibilities.</p> <p>PHASE B (3 weeks): Next, the NSF REU student will make necessary adjustments to the test stand and motor control unit; and document this work.</p> <p>PHASE C (3 weeks): Then, the NSF REU student will perform the particle measurements, and analyze and evaluate the results.</p> <p>PHASE D (2 weeks): Finally, the NSF REU student will document the research performed, prepare a written report, and deliver an end-of-summer presentation on the research performed.</p>	
May 30 - Aug 06, 2022 (10 weeks, 40 h/week)		
Target publications:	<ul style="list-style-type: none"> Emission Control 2023, 11th Emission Control Conference, June 2023, Dresden, Germany http://wordpress.emission-control-dresden.de/english-version/ 	
Necessary Skills/ Knowledge:	<ul style="list-style-type: none"> None 	
Desirable Skills/ Knowledge:	<ul style="list-style-type: none"> Enjoys practical work Interest in vehicle drivetrains 	
Additional Online Resource(s):		

NSF REU Students must have completed at least two semesters of engineering studies prior to the proposed summer research, and they must have at least one semester remaining before they can earn their BS in Engineering.