

Abstract Submitted  
for the OSF12 Meeting of  
The American Physical Society

**Imaging Studies of the Effects of Ethanol/Gasoline Blends on Spark-Assisted HCCI**<sup>1</sup> MOHAMMAD FATOURAIE, MARGARET WOOLDRIDGE, University of Michigan — Spark assist (SA) has been demonstrated to extend the operating limits of homogeneous charge compression ignition (HCCI) modes of engine operation. This experimental investigation focuses on the effects caused by the SA HCCI operation on ignition and combustion properties of 100% indolene and 70% indolene/30% ethanol blends. The spark assist effects are compared to base line HCCI for each blend by varying spark timing at different fuel/air equivalence ratio ( $\phi= 0.4-0.6$ ). High speed imaging is used to understand the effects of flame propagation on heat release rates. Ethanol generally improves engine performance with higher indicated mean effective pressure (IMEP) and higher stability compared to 100% indolene. SA advances phasing within a range of 5 CAD at lower engine speeds (700 rpm) and 11 CAD at higher engine speeds (1200 rpm). SA does not affect heat release rates until immediately (within 5 CAD) prior to autoignition. Unlike previous studies, flames were not observed for all SA conditions. During SA operation, more fuel mass was burned by flame propagation with gasoline compared to E30.

<sup>1</sup>The authors thank the Department of Energy, National Science Foundation (CBET-0457224) and Ford Motor Company-Ford Research Laboratory for financial support of this project.

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Date submitted: 05 Sep 2012

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