


# 16<sup>th</sup> International Green Energy Conference

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Name	Mingfa Yao	
Affiliation	Professor	
<h2 style="color: red;">Invited Plenary Lecture</h2>		
Presentation Title	<b>Modes of IC Engine Combustion Fueled with Ammonia</b>	
Abstract (Approximately 200 words)	<p>Ammonia is a promising non-carbon-based fuel and carrier of hydrogen, and it is an important pathway for internal combustion (IC) engines to achieve zero carbon emissions. However, the key challenges restricting the application of ammonia in IC engines are the difficulty of ignition, the slow spread of flame and the high emission of NO<sub>x</sub>. This presentation introduces the combustion and emission characteristics of different ammonia combustion modes, such as high active fuel pilot ammonia premixed gas, ammonia compression ignition (CI) under active thermal atmosphere and ammonia hydrogen mixture spark ignition. The results show that ammonia CI combustion mode under active thermal atmosphere can achieve stable combustion and has higher combustion efficiency and thermal efficiency than premixed combustion. The reason is that the ammonia CI combustion mode shows the characteristics of "local rich combustion and overall lean combustion", its NO<sub>x</sub> emissions and unburned ammonia emissions are significantly lower than those of premixed combustion. By optimizing the ammonia injection strategy, low NO<sub>x</sub> emissions and extremely low unburned ammonia emissions can be achieved, while avoiding the formation of N<sub>2</sub>O.</p>	
Biographical Sketch (Approximately 200 words)	<p><b>Prof. Mingfa Yao</b>, obtained his PhD degree from Tianjin University in 1999, is a chair professor of Tianjin University, head of the Innovation Research Group supported by the National Natural Science Foundation of China. From March 2009 to March 2021, he served as the director of the State Key Laboratory of Engines (Tianjin University). Prof. Yao has been engaged in the research of engine combustion reaction kinetics, combustion theory and combustion technology. In recent years, he has focused on researching fuel chemical energy storage and zero carbon energy power systems. He has chaired more than 50 key cooperation projects supported by government and industry, and is the head of the national key R&amp;D planning project. He has been selected as one of Elsevier's China Highly Cited Scholars since 2019. He was awarded the "Distinguished Visiting Fellow Award" by the Royal Engineering Society, and was selected as a fellow of SAE International and a fellow of Combustion Institute in 2020.</p>	