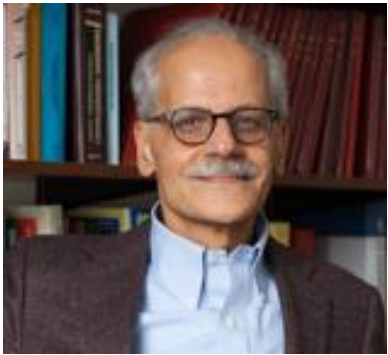


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# 2021 WORLD FUEL CELL CONFERENCE

AUGUST 17-20, 2021 | WATERLOO, CANADA

Name	Ahmed F. Ghoniem	
Affiliation	Massachusetts Institute of Technology	
<h2 style="color: red;">Invited Plenary Lecture</h2>		
Presentation Title	<b>Thermochemical Production of Green and Grey hydrogen</b>	
Abstract (Approximately 200 words)	<p>Hydrogen is a clean energy carrier needed to fuel long distance ground, water and air transportation, and for gradually replacing fossil fuels in industrial and heating applications. Currently hydrogen is produced mostly using methane-steam reforming and water-gas shift, with significant CO<sub>2</sub> emissions. New technologies are emerging for thermochemical water splitting using methane with CO<sub>2</sub> capture. Metal oxides used in these applications transport oxygen across an ion-conducting membrane, or between chemical-looping reactors, enabling the production of pure hydrogen and CO<sub>2</sub> streams. We will review recent developments in these technologies at the materials, reactors and systems' levels, for the production of grey hydrogen. Solar thermochemical water splitting is considered as a viable alternative for the production of green hydrogen, although challenges remain. We will discuss recent developments that promise significant improvement in efficiency and economics at the reactor and system's scales. Interest in hydrogen carriers such as ammonia is growing, and applications of similar concepts to scale up the production of these carrier present an opportunity to accelerate the deployment of these fuels.</p>	
Biographical Sketch (Approximately 200 words)	<p>Ahmed Ghoniem is the Ronald C. Crane Professor of Mechanical Engineering, Director of the Center for Energy and Propulsion Research and the Reacting Gas Dynamics Laboratory. He received his B.Sc. and M.Sc. degree from Cairo University, and Ph.D. at the University of California, Berkeley. His research covers computational engineering, turbulence and combustion, multiphase flow, clean energy technologies with focus on CO<sub>2</sub> capture, renewable energy and fuels. He supervised more than 100 masters, Ph.D. and post-doctoral students; published more than 500 articles in leading journals and conferences; and consulted for the aerospace, automotive and energy industry. He is fellow of the American Society of Mechanical Engineer, the American Physical Society, and the Combustion Institute, and associate fellow of the American Institute of Aeronautics and Astronautics. He received several awards including the ASME James Harry Potter Award in Thermodynamics, the AIAA Propellant and Combustion Award, the KAUST Investigator Award and the "Committed to Caring Professor" at MIT.</p>	