

2020 Saudi Arabia Section of The Combustion Institute Report

Section Website: www.sas-ci.com

Section Chair: Hong G. Im

1. Section Overview

The Saudi Arabian Section of the Combustion Institute (SAS-CI) was founded in 2010 with around 30 members. Today, it has grown to 225 active members from a number of research institutions, including King Abdullah University of Science and Technology (KAUST), King Abdulaziz City for Science and Technology (KACST), King Fahd University for Petroleum and Minerals (KFUPM), King Abdulaziz University, the Royal Commission of Yanbu Research Center, Taif University, Taibah University, Jubail University College, Prince Mohammed Bin Fahd University and Saudi Aramco. In recent years, the local meetings have also attracted greater participation from high-profile international researchers. This reflects favorably on the standard of research undertaken in the region.

Since its inception, the Saudi Arabian Section of the Combustion Institute has been organizing annual meetings. The annual events aim to promote the role of combustion science in the Kingdom by providing a forum for young combustion researchers to present and discuss their research. The ninth annual meetings were held at King Abdullah University of Science and Technology (KAUST) in 2011, King Abdulaziz City for Science and Technology (KACST) in 2012, Saudi Aramco in 2013, King Abdullah University of Science and Technology (KAUST) in 2014, King Abdulaziz City for Science and Technology (KACST) in 2015, Saudi Aramco Technical Exchange in Dhahran in 2016, King Abdullah University of Science and Technology in 2017, King Abdullah Petroleum Studies and Research Center (KAPSARC) in 2018, and King Abdulaziz City for Science and Technology (KACST) in 2019. This year's event was held "online" as a virtual conference due to the current global COVID-19 situation. Amongst other activities, the local section coordinates meetings and workshops on various aspects of combustion, sustainability and energy conversion science.

2. Board of Officers

The current board of officers was elected in May 2017 in accordance with the section by-laws, which state that the board can serve for a maximum of four years. The current section committee is as follows:

Name	Affiliation	Title	Email
Prof. Hong G. Im	KAUST	Chair	hong.im@kaust.edu.sa
Dr. Jihad Badra	Saudi Aramco	Vice-Chair	jihad.badra@aramco.com
Ms. Maryam Altaher	Saudi Aramco	Secretary	maryam.taher@aramco.com
Dr. Kai Morganti	Saudi Aramco	Officer	kai.morganti@aramco.com
Prof. S. Mani Sarathy	KAUST	Officer	mani.sarathy@kaust.edu.sa
Dr. Amer Amer	Saudi Aramco	Officer	amer.amer.4@aramco.com
Prof. William Roberts	KAUST	Officer	william.roberts@kaust.edu.sa

3. 2019 ASPACC Conference

2019 ASPACC Conference took place in 1-5 July, 2019 in Fukuoka International Congress Center, Fukuoka, Japan. In addition, it was announced that the ASPACC 2021 will be held in Abu Dhabi, UAE, jointly hosted by SAS-CI and Khalifa University (led by Dimitrios Kyritsis). The event will take place in the 2nd week of December from 6th to 10th. This is a recognition of the growing activities and contributions from SAS-CI. Considering its location and easy travel access, it is anticipated that the next ASPACC meeting will attract a large number of attendees with diversities nearly at the level of the International Symposium.

The organizing activities are well underway. The meeting venue has been confirmed at Abu Dhabi National Exhibition Centre (ADNEC), and the Professional Conference Organizer has been identified. We are fully aware of the continuing uncertainties with the global pandemic situation. While the event is currently being planned for physical attendance, all contingency plans for hybrid or virtual meeting options are simultaneously considered. The official announcement of the meeting will be made at the 38th Symposium in Adelaide in January 2021.

4. Tenth Annual Meeting – October 2020

The tenth annual meeting was held virtually from 14 to 15 October. The event brought together around 100 experts from institutions in Saudi Arabia, Germany, and England. The theme of the meeting was “Combustion Research Towards Net-zero Emissions Mobility and Power.” A total of 40 presentations were made across the three different sessions.

The tenth annual meeting featured five keynote lectures addressing a diverse range of topics. Thomas Körfer, a Group Vice President at FEV group GmbH in Aachen, Germany, presented ongoing research activities and project results on sustainable, carbon-neutral mobility using green electricity to produce renewable fuels. He commented that this approach represents a complementary way to shift traffic to electrically powered propulsion systems. He concluded his talk with a summary on functional benefits and associated cost estimations.

In the second keynote, Dr. Thang Pham, a Research Science Consultant at Saudi Aramco talked briefly about the concept of the Circular Carbon Economy (CCE) and highlight Saudi Aramco’s efforts on high impact CCE technologies that reduce the cost and create significant environmental advantages.

The third keynote was delivered by James Turner, a professor of Engines and Energy Systems at the University of Bath, UK. Prof. Turner discussed some of the routes to clean hydrogen and then the synergies between hydrogen and some of these engine concepts individually. Prof. Turner concluded with a new concept designed to maximize the efficiency of hydrogen energy conversion to electricity while minimizing emissions.

The fourth keynote was delivered by Prof. William L. Roberts, a director of the Clean Combustion Research Center at the King Abdullah University of Science and Technology, Saudi Arabia. Prof. Roberts reviewed the necessity of carbon capture if we are going to meet the 2.0C temperature rise limit, let alone the 1.5C goal. Then, he put this in context of the Kingdom’s vision of a Circular Carbon Economy and how this fit into the G-20 events hosted by the Kingdom. Prof. Roberts talk focused on a thermodynamic process where the CO₂ is de-sublimated out of the carrier gas stream and captured as dry ice.

The final keynote was delivered by Prof. Kambiz Ebrahimi, Head of Advanced Propulsion group at Loughborough University, UK. Prof. Ebrahimi aimed in his talk to determine the

optimum use of mechanical, electrical and thermal energy at different points in the vehicle drive cycle so that electrical and thermal energy can be used to minimize the draw on the mechanical energy supplied by the ICE.

5. Combustion Conference/Workshop

KAUST hosted two international conference and workshop events last year.

- KAUST Research Workshop: Physics of Turbulent Combustion, December 2-4, 2019
 - The workshop was mainly hosted by Hong Im and Gaetano Magnotti (KAUST), on three themes: physics of turbulent combustion, advances in modeling and diagnostics for practical applications, and enabling technologies for large data and analytics. Over 50 international attendees were present and there were 23 invited talks by world leaders in the fields with stimulating discussions. Many invited speakers and other senior attendees accompanied their postdocs and graduate students to participate in the technical discussion.
- KAUST Research Conference: Transition to Low Carbon Mobility, February 17-19, 2020
 - This was a regular annual technical conference hosted by the Clean Combustion Research Center (CCRC) on various current themes on combustion research. This year's conference was on three topical areas: low carbon fuels and engines, impact of low carbon mobility, and moving up the TRL scale. Over 100 attendees were present with 27 invited speakers. About 40 student/postdoc travel scholarships were also awarded.

6. International Combustion Symposium

The Saudi Arabian section has been well represented at the International Symposium in recent years, and continues in the upcoming 38th Symposium, where a total of 32 papers (24 papers as corresponding authors) were accepted, attesting to the quality and quantity of research activities within the section.

7. SAS-CI Website

A Saudi Arabian Section of the Combustion Institute website was developed in 2017. The website is administered by the KAUST IT Department, and includes information on the local section and the annual meeting reports. The website can be accessed at: www.sas-ci.com.

8. Board of Officers Highlights

Amer Amer, a chief technology of the Transport Technologies division at the R&DC, Saudi Aramco, has presented a talk about "CCE - Closing the carbon cycle with transport solutions in mind" in the Climate Stewardship Working Group (CSWG), G20 Workshop on Sustainable Mobility. The virtual event took place on Thursday, October 08, 2020.

Maryam Altaher, currently the SASCI Secretary and a lab scientist at Transport Technologies R&D division, has presented at the Saudi Chemical Society Webinar a presentation entitled: "The Future of Chemist Graduate at the Research and Development Center in Saudi Aramco". This talk was part of the section activities that aims to promote women in science and technology, inspire, and educate the youth in communities. The virtual webinar brought 150 students and faculty from institutes in Saudi Arabia, Canada, and Algeria. The presentation was well received with many positive comments through the webinar chat box and at twitter as well.

The board of officers continues to work on a number of improvements for the local section. The

proposed short- and medium-term action plan includes:

- Continuing to grow the number of members from Saudi Arabia and neighboring countries.
- Arranging frequent virtual social gatherings and events for members.
- Continuing to create value for the Kingdom and the local combustion research community.