

Sixth International Workshop on the Measurement and Computation of Reacting flows with Carbon Nanoparticles

ISF-6 Workshop

Friday 22 – Saturday 23 July, 2022, Pinnacle Hotel Harbourfront, Vancouver

Draft Version 6

Aims and Objectives

Aims of the ISF Workshop

- To advance understanding and predictive capability of flames with combustion-generated particles, including soot, to identify gaps in this understanding and to coordinate research programs to address them;
- To advance understanding and predictive capability of high temperature reacting flows (HTRF) used to produce valuable carbon-based nano-particles and other products, together with fuels, such as hydrogen, with processes such as flame synthesis and pyrolysis;
- To identify well defined target flames/HTRF and coordinate additional experiments that provide suitable data for model development and validation, spanning a variety of reactants and flow-field environments in each of the research programs;
- To establish an archive of the detailed data sets of target flames/HTRF with defined accuracy and to provide a forum for the exchange and dissemination of these data.
- To advance understanding by establishing clear and consistent definitions and terminology.

Objectives and Targets for ISF-6

- 1) To advance understanding of the strengths and limitations of various modelling approaches for sooting flames and HTRF by detailed comparison of predictions with experimental/DNS data of the following environments:
 - a) **Turbulent high temperature reacting flows:**
 - i) DLR pressurised swirl flames
 - ii) Sandia JP8 jet flame
 - iii) Adelaide bluff body flames
 - b) **Laminar high temperature reacting flows:**
 - i) Laminar opposed jet flames under conditions and fuels matching turbulent target flames
 - ii) Premixed flames under conditions matching turbulent target flames
 - iii) Laminar flames with a series of fuels
 - iv) Adelaide forced laminar flames
- 2) To assess the most effective options with which to advance previous work of the ISF community and to address other HTRF environments involving carbon-based nano-particles;
- 3) To review progress in experimental and numerical methods and coordinate programs to continue their advancement.

Participation

The 2022 workshop will be conducted face-to-face immediately before the International Symposium on Combustion. It will be held within walking distance from related workshops from the international community to facilitate participation in both forums. To contribute numerical or experimental data into either of the programs, please contact the relevant program leaders, listed below. Delegates are also invited to present a poster.

Workshop Program

The first aim will be met through comparison of recent data contributed by the community that compares experiments and models from across the community within the following two research programs, for which contributions are invited via the relevant Program Leaders:

- **Laminar reacting flows as a function of pressure:** Chemical Kinetics (PAH, inception, growth and oxidation); particle dynamics (moment methods, sectional models, coalescence vs. aggregation);
- **Turbulent reacting flows as function of pressure:** jet flames, bluff body flames, swirl flames, pool fires, influence of scale.

The second aim will be met through special discussion panels involving invited presentations from leaders in the field, as listed in the program.

The third aim will be met through open discussion addressing progress and challenges, facilitated by the committees, seeking to refine current understanding of the state of the art in developing predictive capability in these challenging environments.

Informal discussions are facilitated through the poster session, in which all delegates are invited to participate.

Organising Committee

Prof Gus Nathan, Prof Heinz Pitsch, Prof. Hope Michelsen, Prof Bassam Dally, Dr Chris Shaddix, Dr Klaus-Peter Geigle, Prof Tiziano Faravelli, Prof Murray Thomson

Scientific Advisory Committee

Prof Hai Wang, Prof Ömer Gülder, Dr Meredith Colket, Prof Angela Violi, Prof Bill Roberts, Prof Andrea D'Anna, Prof Henning Bockhorn, Prof Peter Lindstedt, Prof. Christof Schulz

Program Leaders and Co-leaders

- **Laminar Flames:** Prof Fabrizio Bisetti, Prof Thomas Dreier, Dr Reza Kholghy
- **Turbulent Flames:** Prof Michael Mueller, Dr Benedetta Franzelli, Dr Zhiwei Sun.



6th ISF Workshop

for the Measurement and Computation of Reacting flows
with Carbon Nanoparticles

ISF-6 Workshop Program (Version 9)

Date	Time	Topic	Chair/Presenter	
Friday 22 nd	08:00 - 09:00	Registration and coffee		
	09:00 - 09:20	Welcome, update, aims and agenda	Shaddix	
	09:20 - 09:40	Reflections on ISF-5 and emerging trends in research drivers	Nathan	
	9:40-10:00	Discussion	Shaddix	
	10:00 - 10:40	Industrial speaker: co-production of carbon black and Hydrogen	Dr Enoch Dames, Monolith Materials Chair: K-P Geigle	
	10:40 - 10:50	Discussion		
	10:50 - 11:20	Coffee		
	11:20 - 13:00	Panel session: Research Challenges and opportunities in pyrolysis and synthesis of carbon-based particles		
	11:20 - 11:40	Hai Wang, Stanford	Chair: Thomson	
	11:40 - 12:00	Hope Michelsen, CU Boulder		
	12:00 - 12:20	Christof Schulz, U Duisburg-Essen		
	12:20 - 13:00	Discussion (Enoch Dames to join panel)	Thomson	
	13:00 - 14:00	Lunch		
	14:00 - 15:00	Invited from CNF special issue		Chairs: Lindstedt / Mueller
		Bill Roberts, KAUST		
		Hernando Colmán, Princeton Univ		
		Klaus Peter Geigle, DLR		
		Peter Lindstedt, Imperial College		
	15:00 - 15:30	PhD Poster Pitches	Chair: Franzelli / Sun	
	15:30 - 16:00	Coffee		
16:00 - 16:30	Turbulent flames / reactors (Atmospheric & pressurised) Summary of progress	Speakers: Mueller / Sun / Franzelli Chair: Dally / Geigle		
16:30 - 18:00	Discussion	Chair: Dally / Geigle		
Free time				
19:00 - 22:00	Posters & informal dinner			
Saturday 23 rd	9:00 - 10:30	Invited from CNF special issue	Chair: Michelsen / Lindstedt	
		Georgios Kelesidis, ETH		
		Fabian Hagen, KIT		
		Benedetta Franzelli, EM2C		
		Heinz Pitsch, RWTH Aachen		
		Andrea Nobili, POLIMI CMIC		

10:30 - 11:00	Coffee Break	
11:00 - 12:00	Laminar flames / reactors: Chemistry & Particle formation - workshop and discussion (Atmospheric and pressurised)	Kholghy / Dreier / Bisetti Chairs: Thomson / Michelsen
12:00 - 13:00	Discussion	Chairs: Thomson / Michelsen
13:00 - 14:00	Lunch (with survey)	
14:00 - 14:30	Open discussion on progress and challenges	Chair: Shaddix /Michelsen
14:30 - 15:30	Discussion: Next focal questions & target reactors	Chairs: Dally / Pitsch
15:30 - 15:45	Coffee	
15:45 - 16:15	Feedback & suggestions on workshop	Geigle / Thomson
16:15 - 16:30	Closing comments	Nathan
16:30	Close	