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

# ISF-7 Workshop

Politecnico - Milano – Saturday-Sunday 20-21, July 2024

## Aims and Objectives

### Aims of the ISF Workshop

- To advance understanding of the evolution of carbonaceous particles and of the predictive modelling tools to characterise this in practical environments, including:
  - combustion-generated environments, such as flames and fires,
  - high-temperature hydrocarbon pyrolysis and carbon nanoparticle synthesis environments,
- To identify gaps in current understanding and coordinate research programs to address them, particularly via joint investigations in well-defined target flames or reactors purpose-designed for the development and validation of predictive models.
- To coordinate and foster the advancement of the underpinning experimental and numerical methods needed to support the above objectives.
- To establish an archive of detailed data sets of target flames and reactors with defined accuracy and provide a forum for the exchange and dissemination of these data.
- To advance understanding by establishing clear and consistent definitions and terminology.
- To foster the professional development of PhD students and emerging researchers in the field.

### Objectives and Targets for ISF-7

1) To advance understanding of the mechanisms governing the evolution of carbon materials, with a particular focus on the following challenges and environments:
   a) **Turbulent high-temperature reacting flows**
   b) **Laminar high-temperature reacting flows**
   c) **Pyrolysis and synthesis of carbon nanoparticles**
   d) **Soot evolution in fires**

2) To advance understanding of the strengths and limitations of various modelling approaches for sooting flames and reactors by detailed comparison of predictions with experimental/Reference numerical data of the following environments:
   a) **Turbulent high-temperature reacting flows:**
   b) **Laminar high-temperature reacting flows:**

3) To review progress in experimental and numerical methods and coordinate programs to continue their advancement.

***Note:*** *Refer to ISF website for speaker details:* *www.adelaide.edu.au/cet/isfworkshop/*

## Participation

The 2024 workshop will be conducted face-to-face within the joint forum for satellite meetings for the International Symposium on Combustion. To contribute numerical or experimental data into the laminar or turbulent reacting flow 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 discussions 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 (see website for details).

**Organising Committee:**

Gus Nathan, Heinz Pitsch, Bassam Dally, Chris Shaddix, Klaus Peter Geigle, Hope Michelsen, Tiziano Faravelli, Michael Mueller.

**Scientific Advisory Committee**:

Med Colket, Andrea D'Anna, Ömer Gülder, Hai Wang, Bill Roberts, Peter Lindstedt, Christof Schulz, Henning Bockhorn, Angela Violi, Murray Thomson,

*Industry Advisors:* Enoch Dames, Roscoe Taylor.

**Program Leaders and Co-leaders**
**Laminar reactors:** Chiara Saggese, Georgios Kelesidis, Reza Kholghy, Joaquin Camacho.
**Turbulent reactors:** Benedetta Franzelli, Zhiwei Sun, Federica Ferraro.

**Poster session and student prize committee:**
**Co-chairs:** Benedetta Franzelli, Georgios Kelesidis,
**Committee:** Reza Kholghy, Federica Ferraro, Joaquin Camacho, Zhiwei Sun.

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# 7th ISF Workshop Program

## for the Measurement and Computation of Reacting flows with Carbon Nanoparticles

| Date | Time | Topic | Chair/Presenter |
|---|---|---|---|
| Sat 20th | 08:00 - 09:00 | Registration and coffee | |
| | 09:00 - 09:15 | Welcome, update, aims and agenda | Shaddix |
| | 09:15 - 09:30 | Reflections on ISF-6 and emerging trends in research drivers | Nathan |
| | 9:30-9:45 | Discussion | Shaddix |
| | 9:45 – 10:15 | Industrial speaker: Co-production of carbon black and hydrogen | Prof Murray Thomson VP & Chief Scientist, Aurora Hydrogen Chair: Geigle |
| | 10:15 - 10:30 | Discussion | |
| | 10:30 - 11:00 | Coffee | |
| | 11:00 - 12:30 | Panel session: Research challenges and opportunities in pyrolysis and synthesis of carbon-based particles | |
| | 11:00 - 11:15 | Roscoe Taylor | Chair: Faravelli / Wang |
| | 11:15 - 11:30 | Jacob Martin (Curtin) | |
| | 11:30 - 11:45 | Tim Fisher (UCLA) | |
| | 11:45 – 12:00 | Osvalda Senneca (Naples) | |
| | 12:00 - 12:30 | Discussion with all speakers, including Murray Thomson | |
| | 12:30 - 13:30 | Lunch | |
| | 13:30 - 15:00 | Panel session: Challenges and opportunities in advancing understanding of soot evolution in fires | Chairs: Lindstedt / Camacho |
| | 13:30 - 13:45 | Samuel Manzello (Tohoku) | |
| | 13:45 - 14:00 | Chiara Saggese (Livermore) | |
| | 14:00 - 14:15 | Jean-Louis Consalvi (Marsaille) | |
| | 14:15 - 14:30 | Rajan Chakrabarty (Washington) | |
| | 14:30 – 15:00 | Panel Discussion | |
| | 15:00 – 15:30 | PhD poster pitches | Chairs: Franzelli, Kelesidis, With poster committee |
| | 15:30 - 16:00 | Coffee | |
| | 16:00 - 16:30 | Turbulent flames / reactors (atmospheric & pressurised): Summary of progress | Speakers: Franzelli / Sun / Ferraro Chair: Dally / Geigle |
| | 16:30 – 18:00 | Discussion | Chair: Dally / Geigle |
| | | Free time | |
| | 19:00 - 22:00 | Posters & informal dinner | |

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| **Sunday 21st** | **9:00 - 10:30** | **Panel session: Advances in measurement techniques** | **Chair: Chris Shaddix / Geigle** |
| | **9:00 – 9:15** | **Francesca Migliorini (ICMAT Milan)** | |
| | **9:15 – 9:30** | **Mario Commodo (Naples)** | |
| | **9:30 – 9:45** | **Sonu Kumar (KAUST)** | |
| | **9:45 – 10:00** | **Stefan Will (Erlangen-Nuernberg)** | |
| | **10:00 – 10:30** | **Discussion** | |
| | **10:30 - 11:00** | **Coffee Break** | |
| | **11:00 - 12:00** | **Laminar flames / reactors: Chemistry & particle formation - workshop and discussion (atmospheric and pressurised)** | **Presenters: Saggese, Kelesidis, Kholghy, Camacho Chairs: Faravelli / Gulder** |
| | **12:00 – 13:00** | **Discussion** | **Chairs: Faravelli / Gulder** |
| | **12:30 - 13:30** | **Lunch (with survey)** | |
| | **13:30 - 14:30** | **Open discussion on progress and challenges** | **Chair: Shaddix /Faravelli** |
| | **14:30 - 15:00** | **Discussion: Next focal questions & target reactors** | **Chairs: Dally / Pitsch** |
| | **15:00 - 15:15** | **Feedback & suggestions on workshop** | **Geigle / Thomson** |
| | **15:15 - 15:30** | **Closing comments** | **Nathan** |
| | **15:30** | **Close** | |

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