

Welcome to ISF-7

Chris Shaddix, Sandia National Labs, USA



Historical Context for Agenda/Aims for ISF-7

- 1st ISF Workshop in 2012 (Warsaw Symposium):
 - “Each workshop will compare numerical predictions with measured data from target flames, selected to be suitable for model development and validation while also being relevant to practical application.”
 - Agenda structured around 3 programs: Laminar flames, Turbulent flames, Pressurised flames and sprays
- ISF-3: added topical discussion on “Soot Data Uncertainty & Standardisation”
- ISF-4: Integrated pressurized flames into two main programs; added topical discussions on “Flame series from non-sooting to sooting” (joint with TNF workshop) and “Current knowledge on PAH chemistry” (joint with Flame Chemistry workshop)
- ISF-6: added panel on “Pyrolysis and synthesis of carbon-based particles”; included invited talks from special CNF issue on soot; added PhD Poster Pitches (and contest)

Progress on Soot Predictions in Turbulent Flames during ISF Workshop Series

- f_v predictions in turbulent ethylene flames are pretty solid now
- f_v predictions in turbulent methane flames are still somewhat challenging, due to the long distance/time for soot inception in these flames and difficulties in accurately capturing apparent oxidation rates
- Despite improved availability of experimental data on soot temperature and soot particle sizes in these flames, little modeling comparison to these quantities (soot T , d_p) has been presented, which brings into question the overall fidelity of the current soot models



Aims for ISF-7

- 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.

Overview of Agenda for ISF-7

- Retain from past ISF workshops
 - Turbulent Flame/Reactor program
 - Laminar Flame/Reactor program
 - panel on “Pyrolysis and synthesis of carbon-based particles” (including invited plenary talk from Murray Thomson, Chief Scientist of Aurora Hydrogen)
 - PhD Poster Pitches/Contest
 - Saturday evening dinner with posters
- Revisit “Advances in measurement techniques” with a special panel session
- Add new panel on “Understanding of soot evolution in fires”
- End workshop with “Open discussion on progress and challenges” and “Next focal questions & target reactors”

Agenda for ISF-7 – Saturday

| Date | Time | Topic | Chair/Presenter | |
|-------------------------|---------------|---|---|--|
| Sat 20 th | 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 (Orion) | Chair: Faravelli / Wang | |
| | 11:15 - 11:30 | Jacob Martin (Curtin) | | |
| | 11:30 - 11:45 | Tim Fisher (UCLA) | | |
| | 11:45 – 12:00 | Osvolda 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 (Marseille) | | |
| | 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 | | |

Agenda for ISF-7 – Sunday

| | | | |
|----------------------------|--|---|--|
| Sunday 21 st | 9:00 - 10:30 | Panel session: Advances in measurement techniques | Chair: Chris Shaddix / Geigle |
| | 9:00 – 9:15 | Francesca Migliorini (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 | | |