

# Jet/Rocket Fuel Kinetics Experiments and Model Development 2015

Dr. Chiping Li | April 30 – May 1, 2015 | Arlington, VA

Basic Research Innovation and Collaboration Center (BRICC)  
4075 Wilson Blvd., Suite 350 | Liberty Room  
Arlington, VA 22203

## Day 1 – April 30, 2015

| Time                                                                   | Title                                                                                                           | Speaker                                                    |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| 7:30-7:55                                                              | Registration                                                                                                    |                                                            |
| <b>Day 1 - Problem Definitions (1) (Chair: Fokion N. Egolfopoulos)</b> |                                                                                                                 |                                                            |
| 7:55-8:00                                                              | Announcements                                                                                                   |                                                            |
| 8:00-8:15                                                              | Welcome Remarks and Workshop Objectives                                                                         | Fokion N. Egolfopoulos (USC) & Chiping Li (AFOSR)          |
| 8:15-8:45                                                              | Overview of Modeling Approaches                                                                                 | Hai Wang (Stanford University)                             |
| 8:45-9:00                                                              | Jet Fuels of Interest                                                                                           | Tim Edwards (AFRL Wright-Patterson)                        |
| 9:00-9:15                                                              | Rocket Propulsion Fuels of Interest                                                                             | Matthew Billingsley (AFRL Edwards)                         |
| 9:15-9:45                                                              | Thermodynamic Properties: Capabilities and Database                                                             | Tom Bruno (NIST Boulder)                                   |
| 9:45-10:05                                                             | <b>BREAK</b>                                                                                                    |                                                            |
| 10:05-10:35                                                            | Research Needs in Combustion – An Industry Perspective                                                          | Saadat Syed (Pratt & Whitney)                              |
| 10:35-11:05                                                            | Thermodynamic and Flow Conditions of Turbine Engines of Relevance to Combustion Chemistry                       | Anthony Dean (GE GRC Niskayuna)                            |
| 11:05-11:35                                                            | Impact of Detailed Chemical Kinetics on Rocket Combustion Dynamics                                              | Venke Sankaran (AFRL Edwards)                              |
| 11:35-11:50                                                            | Direct Numerical Simulations of Premixed <i>n</i> -Dodecane Flames in the Presence of High-Intensity Turbulence | Alexei Poludnenko (Naval Research Laboratory)              |
| 11:50-12:20                                                            | Proposed Model Development and Test Targets                                                                     | Hai Wang (Stanford University)                             |
| 12:20-1:30                                                             | <b>LUNCH</b>                                                                                                    |                                                            |
| <b>Day 1 – Problem Definitions (2) (Chair: Guillaume Blanquart)</b>    |                                                                                                                 |                                                            |
| 1:30-2:30                                                              | Open Discussion: Proposed Model Targets                                                                         | <b>Discussion lead:</b> Matthew Billingsley (AFRL Edwards) |

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| <b>2:30-2:50</b> | Local Thermodynamic and Time-flow History in Turbine Combustors        | Matthias Ihme (Stanford University)                      |
| <b>2:50-3:10</b> | <b>BREAK</b>                                                           |                                                          |
| <b>3:10-3:30</b> | NTC Chemistry in Advanced Turbines                                     | Med Colket (UTRC, Retired)                               |
| <b>3:30-3:50</b> | Time Scales of NTC as a Function of Fuel, Pressure, and Temperature    | Matt Oehlschlaeger (Rensselaer Polytechnic Institute)    |
| <b>3:50-4:10</b> | Focusing on what is Important in Low-Temperature Ignition Chemistry    | Bill Green (MIT)                                         |
| <b>4:10-5:00</b> | Open Discussion: NTC Chemistry and its Relevance to Turbine Combustors | <b>Discussion lead:</b><br>Guillaume Blanquart (Caltech) |
| <b>5:00</b>      | <b>MEETING ADJOURNED FOR THE DAY</b>                                   |                                                          |

| <b>Day 2 – May 1, 2015</b>                                |                                               |                                                       |
|-----------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------|
| <b>Time</b>                                               | <b>Title</b>                                  | <b>Speaker</b>                                        |
| <b>7:30-8:00</b>                                          | <b>Registration</b>                           |                                                       |
| <b>Day 2 – Experimental Methods (1) (Chair: Hai Wang)</b> |                                               |                                                       |
| <b>8:00-8:10</b>                                          | Announcements                                 |                                                       |
| <b>8:10-8:30</b>                                          | Review of Shock Tube Experiments (1)          | Ronald K. Hanson (Stanford University)                |
| <b>8:30-8:50</b>                                          | Review of Shock Tube Experiments (2)          | Ken Brezinsky (University of Illinois at Chicago)     |
| <b>8:50-9:10</b>                                          | Review of Shock Tube Experiments (3)          | Matt Oehlschlaeger (Rensselaer Polytechnic Institute) |
| <b>9:10-9:30</b>                                          | Review of Shock Tube Experiments (4)          | Eric Petersen (Texas A&M University)                  |
| <b>9:30-9:50</b>                                          | Review of Flow Reactor Experiments (1)        | Tom Bowman (Stanford University)                      |
| <b>9:50-10:10</b>                                         | <b>BREAK</b>                                  |                                                       |
| <b>10:10-10:30</b>                                        | Review of Flow Reactor Experiments (2)        | Fred Dryer (Princeton University)                     |
| <b>10:30-10:50</b>                                        | Review of Flow Reactor Experiments (3)        | Nick Cernansky (Drexel University)                    |
| <b>10:50-11:10</b>                                        | Review of Flow Reactor Experiments (4)        | Harsha Chelliah (University of Virginia)              |
| <b>11:10-11:30</b>                                        | Review of Jet Stirred Reactor Experiments (1) | Yiguang Ju (Princeton University)                     |

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| <b>11:30-11:50</b>                                               | Review of Jet Stirred Reactor Experiments (2)                       | Nils Hansen (Sandia National Laboratories)        |
| <b>11:50-12:10</b>                                               | Review of Synchrotron Photoionization Mass Spectrometry Experiments | Nils Hansen (Sandia National Laboratories)        |
| <b>12:10-1:30</b>                                                | <b>LUNCH</b>                                                        |                                                   |
| <b>Day 2 – Experimental Methods (2) (Chair: Harsha Chelliah)</b> |                                                                     |                                                   |
| <b>1:30-1:50</b>                                                 | Review of Laminar Flames Experiments (1)                            | Ed Law (Princeton University)                     |
| <b>1:50-2:10</b>                                                 | Review of Laminar Flames Experiments (2)                            | Yiguang Ju (Princeton University)                 |
| <b>2:10-2:30</b>                                                 | Review of Laminar Flames Experiments (3)                            | Fokion N. Egolfopoulos (USC)                      |
| <b>2:30-3:00</b>                                                 | Uncertainty Quantification                                          | David A. Sheen (NIST)                             |
| <b>3:00-3:30</b>                                                 | <b>BREAK</b>                                                        |                                                   |
| <b>3:30-4:00</b>                                                 | Experimental Method Group Breakouts                                 |                                                   |
| <b>4:00-4:30</b>                                                 | Group Summary                                                       |                                                   |
| <b>4:30-5:00</b>                                                 | Open Discussion and Concluding Remarks                              | Fokion N. Egolfopoulos (USC) & Chiping Li (AFOSR) |
| <b>5:00</b>                                                      | <b>MEETING ADJOURNED</b>                                            |                                                   |