

# Oscillations & Dynamic Instabilities in Chemical Systems

*Gordon Research Conference*

Chemical Self-Organization Far from Equilibrium

July 17-22, 2016

Stoweflake Conference Center

Stowe, VT

Chair: Annette F. Taylor

Vice Chair: Istvan Z. Kiss

## Contributors



The conference also gratefully acknowledges contributions from Irving Epstein, Dick Field, Stanley D. Furrow, Marcus Hauser, Stefan C. Mueller, and Agota Toth.

## Meeting Program

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### Sunday

2:00 pm - 9:00 pm	Arrival and Check-in
6:00 pm	Dinner
7:30 pm - 7:40 pm	Welcome / Introductory Comments by GRC Site Staff
7:40 pm - 9:30 pm	<b>Electrochemical and Nanoscale Instabilities</b> Discussion Leader: <b>Tomohiko Yamaguchi</b> (National Institute of Advanced Industrial Science and Technology (AIST), Japan)
7:40 pm - 8:20 pm	<b>Harm Rotermund</b> (Dalhousie University, Canada) "In-Situ Visualization of Pitting Corrosion and the Effect of Surface Patterning on Corrosion Improvement"
8:20 pm - 8:35 pm	Discussion

8:35 pm - 9:15 pm **Zuzanna Siwy** (University of California, Irvine, USA)  
"Nanopore Current Oscillations"

9:15 pm - 9:30 pm Discussion

## Monday

7:30 am - 8:30 am Breakfast

8:30 am Group Photo

### 9:00 am - 12:30 pm **Biological Oscillators**

Discussion Leader: **Stanislav Shvartsman** (Princeton University, USA)

9:00 am - 9:40 am **Carl Johnson** (Vanderbilt University, USA)  
"A Circadian Nanomachine Ticking *In Vitro*"

9:40 am - 10:00 am Discussion

10:00 am - 10:30 am Coffee Break

10:30 am - 11:10 am **Marcus Hauser** (Otto-von-Guericke Universität Magdeburg, Germany)  
"Self-Organization, Oscillations and Motility of Giant Cells"

11:10 am - 11:30 am Discussion

11:30 am - 11:45 am **Albert Wong** (Radboud University Nijmegen, The Netherlands)  
"Understanding the Influence of Temperature on an Enzymatic Oscillator"

11:45 am - 11:50 am Discussion

11:50 am - 12:05 pm **Hirokazu Fukuda** (Osaka Prefecture University, Japan)  
"Estimation of Cellular Phase Response Function Through Spatiotemporal Pattern in Plant Circadian Clock"

12:05 pm - 12:10 pm Discussion

12:10 pm - 12:25 pm **Nathan Tompkins** (Brandeis University, USA)  
"Reconfigurable Topology Induced Transitions in BZ Emulsion Networks"

12:25 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm Dinner

### 7:30 pm - 9:30 pm **Reaction Network Design**

Discussion Leader: **Igor Schreiber** (University of Chemistry and Technology, Prague, Czech Republic)

7:30 pm - 8:10 pm **John Tyson** (Virginia Polytechnic Institute, USA)  
"Network Motifs and Functional Modules in Biochemical Reaction Networks"

8:10 pm - 8:30 pm Discussion

8:30 pm - 9:10 pm **Elisa Franco** (University of California, Riverside, USA)  
"Directing Molecular Processes with Synthetic Oscillators"

9:10 pm - 9:30 pm Discussion

## Tuesday

- 7:30 am - 8:30 am Breakfast
- 9:00 am - 12:30 pm **Self-Propelled Motion and Active Matter**  
Discussion Leader: **Jonathan Howse** (University of Sheffield, United Kingdom)
- 9:00 am - 9:40 am **Samuel Sanchez** (Institute for Bioengineering of Catalonia (IBEC), Spain)  
"Strategies for Controlling and Guiding Catalytic Micromotors"
- 9:40 am - 10:00 am Discussion
- 10:00 am - 10:30 am Coffee Break
- 10:30 am - 11:10 am **Cecile Cottin-Bizonne** (University of Lyon / CNRS, France)  
"From Dilute to Dense Suspension of Active Colloids"
- 11:10 am - 11:20 am Discussion
- 11:20 am - 12:00 pm **Satoshi Nakata** (Hiroshima University, Japan)  
"Spatio-Temporal Behaviors of Self-Propelled Motors Characteristically Responsive to the Environments"
- 12:00 pm - 12:10 pm Discussion
- 12:10 pm - 12:25 pm **Veronique Pimienta** (IMRCP Laboratory, CNRS UMR 5623, University of Toulouse, France)  
"From Spreading and Dewetting to Highly Ordered Patterns"
- 12:25 pm - 12:30 pm Discussion
- 12:30 pm Lunch
- 1:30 pm - 4:00 pm Free Time
- 4:00 pm - 6:00 pm Poster Session
- 6:00 pm Dinner
- 7:30 pm - 9:30 pm **Active Particles and Molecules on the Micro- and Nano-Scales**  
Discussion Leader: **Kenneth Showalter** (West Virginia University, USA)
- 7:30 pm - 8:10 pm **Raymond Kapral** (University of Toronto, Canada)  
"How Protein Activity Can Enhance Transport in the Cell"
- 8:10 pm - 8:30 pm Discussion
- 8:30 pm - 9:10 pm **Ayusman Sen** (Pennsylvania State University, USA)  
"Collective Behavior of Self-Powered Single Molecules and Nanoparticles"
- 9:10 pm - 9:30 pm Discussion

## Wednesday

- 7:30 am - 8:30 am Breakfast
- 9:00 am - 12:30 pm **Reactive Flow Systems**  
Discussion Leader: **Anne De Wit** (Université Libre de Bruxelles, Belgium)
- 9:00 am - 9:40 am **Tanguy Le Borgne** (Université de Rennes, France)  
"Dynamics of Reactive Fronts in Porous Media"
- 9:40 am - 10:00 am Discussion
- 10:00 am - 10:30 am Coffee Break
- 10:30 am - 11:10 am **Agota Toth** (University of Szeged, Hungary)  
"Flow-Driven Pattern Formation in Precipitate Systems"
- 11:10 am - 11:20 am Discussion
- 11:20 am - 12:00 pm **Julyan Cartwright** (Spanish National Research Council (CSIC), Spain)  
"Chemobrionics"
- 12:00 pm - 12:10 pm Discussion
- 12:10 pm - 12:25 pm **Yuichiro Nagatsu** (Tokyo University of Agriculture and Technology, Japan)  
"Suppression of a Hydrodynamic Instability by Chemical Reaction Producing Gel"
- 12:25 pm - 12:30 pm Discussion
- 12:30 pm Lunch
- 1:30 pm - 4:00 pm Free Time
- 4:00 pm - 6:00 pm Poster Session
- 6:00 pm Dinner
- 7:00 pm - 7:30 pm Business Meeting  
*Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair*
- 7:30 pm - 9:30 pm **Programming Dynamic Behavior in Materials**  
Discussion Leader: **Istvan Szalai** (Eötvös Lorand University, Hungary)
- 7:30 pm - 8:10 pm **Andreas Walther** (DWI - Leibniz Institute for Interactive Materials, RWTH Aachen University, Germany)  
"Time-Programmed Self-Assemblies and Dynamic Materials"
- 8:10 pm - 8:30 pm Discussion
- 8:30 pm - 9:10 pm **John Pojman** (Louisiana State University, USA)  
"Time-Lapse and Cure-On Demand Polymerizations"
- 9:10 pm - 9:30 pm Discussion

## Thursday

7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<b>Self-Replicating Chemical Systems</b>
	Discussion Leaders: <b>Mark Tinsley</b> (West Virginia University, USA) and <b>Punit Parmananda</b> (Indian Institute of Technology Bombay, India)
9:00 am - 9:40 am	<b>Sijbren Otto</b> (University of Groningen, The Netherlands) "Self-Replication Driven by Autocatalytic Self-Assembly: Towards Making Life in the Lab"
9:40 am - 10:00 am	Discussion
10:00 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	<b>Gonen Ashkenasy</b> (Ben-Gurion University of the Negev, Israel) "Bistability and Coupled Oscillations in Peptide Replication Networks"
11:10 am - 11:30 am	Discussion
11:30 am - 11:45 am	<b>Jan Frederik Totz</b> (Technical University of Berlin, Germany) "Synchronization in Large Chemical Oscillator Arrays"
11:45 am - 11:50 am	Discussion
11:50 am - 12:05 pm	<b>Sumana Dutta</b> (Indian Institute of Technology Guwahati, India) "Reconnection of Scroll Waves in an Excitable Medium"
12:05 pm - 12:10 pm	Discussion
12:10 pm - 12:25 pm	<b>James Pantaleone</b> (University of Alaska Anchorage, USA) "Chemical Gardens at the Air Fluid Interface"
12:25 pm - 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	<u>Poster Session</u>
6:00 pm	Dinner
7:30 pm - 9:30 pm	<b>Spatial Organisation in Heterogeneous Media</b>
	Discussion Leader: <b>Istvan Lagzi</b> (Budapest University of Technology and Economics, Hungary)
7:30 pm - 8:10 pm	<b>Irving Epstein</b> (Brandeis University, USA) "Nonlinear Dynamics Outside of the Beaker"
8:10 pm - 8:30 pm	Discussion
8:30 pm - 9:10 pm	<b>Oliver Steinbock</b> (Florida State University, USA) "Self-Organizing Precipitation Reactions: A Gateway to a New Engineering Paradigm?"
9:10 pm - 9:30 pm	Discussion

## Friday

7:30 am - 8:30 am	Breakfast
9:00 am	Departure