



Emulsion Polymers Consulting and  
Education, LLC presents:

## ***Core-Shell Latex Particles- Fundamental Aspects of Morphology Control***



***3.5 Day Interactive Workshop  
May 6-9, 2019  
On the Campus of the University of  
New Hampshire  
Durham, New Hampshire USA***

### **Faculty**

***Donald C. Sundberg, PhD  
John G. Tsavalas, PhD  
Jeffrey M. Stubbs, PhD***

**OBJECTIVES** This intensive workshop deals with the basic factors controlling particle morphology in synthetic latexes used for coatings, adhesives, impact modifiers and biomedical applications. Thermodynamic principles are applied to investigate the effect of experimental recipe and process variables. Computer simulations are used to design latex particles and analyze the morphology via TEM. Non-equilibrium morphologies and emulsion polymerization kinetics are treated in detail through experimental design and computer simulation. Participants should be familiar with operating computers in a windows environment.

**INTENDED AUDIENCE:** This workshop is directed towards scientists and engineers involved in product development and latex processing operations, and who produce or use water based latexes for architectural and paper coatings, textiles and carpet backings, pressure sensitive adhesives, printing inks, impact modifiers, etc.

**STRUCTURE OF THE WORKSHOP:** This 3.5 day workshop will be conducted in a ***highly interactive manner*** with participants being engaged in discussions, demonstrations, and problem solving.

### **REGISTRATION INFORMATION**

The registration fee includes the full book of slides for the workshop, coffee breaks, lunches and Tuesday evening dinner. It does not include accommodations or travel. Early registration is recommended due to the workshop size limitation of 24 participants.

Registration Fee: \$1900 USD  
***Registration Form*** --> Go to page 4

**Contact for further information:**

**[info@epced.com](mailto:info@epced.com)**

### **HOTELS, TRAVEL, LOCAL ATTRACTIONS**

A selection of hotels in the local area is listed on the last page. Each has a link to its website for on-line reservations. The Durham, NH area is well served by Logan Airport in Boston, Massachusetts and Manchester-Boston Regional Airport in Manchester, NH. Durham is located in the seacoast region of New Hampshire and many tourist options are available. [www.visitnh.gov/](http://www.visitnh.gov/). Also see the UNH website [www.unh.edu](http://www.unh.edu).

# ***Core-Shell Latex Particles- Fundamental Aspects of Morphology Control***

## **Day 1**

### **AM:**

1. Goals of the Workshop
2. Examples of particle morphologies
3. Equilibrium and kinetic structures
4. Emulsion polymerization principles
5. Preparation of first stage (seed) latex
6. Post-polymerization treatment

### **PM:**

1. Design of seed latex recipe/process
2. Morphology characterization of structured latex particles
3. Determination of particle structure from analytical data

## **Day 2**

### **AM:**

1. Equilibrium morphologies
2. Free energy concepts/applications
3. Interfacial tensions
4. Effect of cross-linking
5. Effect of functional additives

### **PM:**

1. Use of interactive software for predicting equilibrium morphology
2. Computation of interfacial polymer
3. Morphology predictions through examples
4. Hands-on use of UNHLATEX<sup>®</sup> Eqmorph software – design problem

## **Day 3**

### **AM:**

1. Kinetic controlled morphology
2. Multi-phase polymerization
3. Phase diagrams
4. Diffusion in polymers
5. Phase separation, latex aging

### **PM:**

1. Use of interactive software for predicting kinetic morphology
2. Morphology predictions through examples
3. Hands-on use of UNHLATEX<sup>®</sup> Kmorph software – design problem

## **Day 4**

### **AM:**

1. Structural evolution of latex particle morphology during polymerization
2. Interactive session – developing a morphology matrix
3. Multi-lobed particles – a new equilibrium basis
4. Morphology decision matrix and closing comments

## *Core-Shell Latex Particles – Fundamental Aspects of Morphology Control*

### **Faculty Profiles**

**Professor Donald C. Sundberg** has been working in the field of emulsion polymers for 51 years. He received a bachelor's degree in chemical engineering from Worcester Polytechnic Institute (Massachusetts) and his Ph.D. from the University of Delaware. He worked on latex based impact modifiers for ABS resins with the Monsanto Company, scaling processes to the 10,000 gallon reactor size. He has extensive research experience in emulsion polymerization and is widely recognized for his work on structured latex particles. This has resulted in nearly 100 peer reviewed publications and many conference papers. In addition he has conducted many workshops, most notably the one on latex particle morphology control, now in its 23rd annual offering. He spent a sabbatical year at the Institute for Surface Chemistry in Stockholm and was Chair of the 1997 Gordon Research Conference on Polymer Colloids. He is the 2016 Mattiello Memorial Lecture awardee from the American Coatings Association. His research interests are in polymerization kinetics in solution, bulk and emulsion systems, interfacial science and polymer morphology control, diffusion in polymers, and coatings. He is an Emeritus Professor of Materials Science at the University of New Hampshire and is the founder of Emulsion Polymers Consulting and Education, LLC.

**Professor John G. Tsavalas** is an Associate Professor of Chemistry at the University of New Hampshire, the director of the Nanostructured Polymers Research Center, and the deputy director of an interdisciplinary multi-department research center at UNH centered around Advanced Materials (CAMMI). He received his PhD in Chemical Engineering from The Georgia Institute of Technology (Atlanta, GA, USA) after which he was a Senior Research Scientist in The Dow Chemical Company (Midland, MI USA). In industry he worked on a wide variety of polymer colloid related R&D with particular emphasis on nanostructured latex particles. At the University of New Hampshire, Professor Tsavalas' current active areas of research are colloidal nanostructure morphology development, sustainably derived polymer colloids, the interaction and distribution of water in polymer colloids, and dynamic modeling of interactions, kinetics, diffusion, and phase separation in colloidal systems.

**Dr. Jeffrey M. Stubbs** is a Latex Ink Chemist at HP, Inc. at their R&D site in San Diego, CA. Prior to that, he spent 11 years as a Senior Scientist at DSM Coating Resins in Wilmington, Massachusetts. Before moving to industry he spent over a decade at the University of New Hampshire working to understand the factors controlling latex particle morphology development while completing B.S. and M.S. degrees in Chemical Engineering, and a PhD in Materials Science. He enjoys putting his understanding of emulsion polymerization, particle morphology and polymer science to use in developing new latex binders for paints and coatings, and now for latex based inks, with improved performance and reduced environmental impact.

## Registration Form

### *Core-Shell Latex Particles – Fundamental Aspects of Morphology Control*

Durham, NH 03824 USA

May 6-9, 2019

Name \_\_\_\_\_

Address \_\_\_\_\_

City/State \_\_\_\_\_

Postal Code \_\_\_\_\_

Country \_\_\_\_\_

Position or Title \_\_\_\_\_

Organization \_\_\_\_\_

Phone \_\_\_\_\_

Fax \_\_\_\_\_

E-mail \_\_\_\_\_

### **Participant Category**

- Standard price for industrial participant: \$1900 (USD)
- Discounted price for additional participant(s) from the same company: \$1800 (USD)
- Academic participant: \$1600 (USD)

***There is a non-refundable fee of \$50 (USD). Cancellation of registration can be made up until April 6, 2019 with a full refund less the \$50 processing fee.***

### **Method of Payment:**

- Credit Card

\_\_\_ Visa \_\_\_ MasterCard \_\_\_ American Express

Card # \_\_\_\_\_

Visa or MC Security Code # (last 3 digits on back of card) \_\_\_\_\_

AMEX Security Code # (4 digits on front of card) \_\_\_\_\_

Expiration date \_\_\_\_\_

Signature \_\_\_\_\_

Credit Card billing address (if different than above): \_\_\_\_\_

- 
- Wire transfer from bank --- Go to [info@epced.com](mailto:info@epced.com) and request banking instructions.

**This registration can be sent as an e-mail attachment to [info@epced.com](mailto:info@epced.com). If you prefer not to e-mail your credit information, submit this form without it and call 1-603-742-3370 to complete your registration. *This registration form may serve as an invoice for those who register.***

## LODGING OPTIONS

### WALKING DISTANCE TO UNH (about 10 min):

Holiday Inn Express  
2 Main St, Durham, NH 03824  
603-868-1234  
[www.hig.com](http://www.hig.com)

Three Chimneys Inn  
17 Newmarket Rd, Durham, NH 03824  
603-868-7800  
[www.threechimneysinn.com](http://www.threechimneysinn.com)

### REQUIRES A VEHICLE:

#### DOVER, NH

Comfort Inn & Suites  
10 Hotel Dr., Dover, NH 03820  
603-750-7507  
[www.comfortinn.com](http://www.comfortinn.com)

The Garrison Hotel  
200 Sterling Way, Dover, NH 03820  
603-742-0400  
[www.choicehotels.com](http://www.choicehotels.com)

Hampton Inn  
9Hotel Dr., Dover, NH 03820  
603-516-5600  
[hamptoninn3.hilton.com](http://hamptoninn3.hilton.com)

Silver Fountain Inn  
103 Silver St, Dover, NH 03820  
603-750-4200 or 888-548-6888  
[www.silverfountain.com](http://www.silverfountain.com)

#### PORTSMOUTH, NH

Hilton Garden Inn  
100 High St, Portsmouth, NH 03801  
866-413-1105  
[www.hgiportsmouth.com](http://www.hgiportsmouth.com)

Residence Inn Portsmouth Downtown  
100 Deer St, Portsmouth, NH 03801  
603-968-5095  
[www.marriott.com](http://www.marriott.com)

Sheraton Portsmouth Harborside  
250 Market St, Portsmouth, NH 03801  
603-431-2300  
[www.sheratonportsmouth.com](http://www.sheratonportsmouth.com)

Hampton Inn & Suites Portsmouth  
23 Portwalk Place, Portsmouth NH 03801  
603-431-1499  
[hamptoninn.hilton.com/Portsmouth](http://hamptoninn.hilton.com/Portsmouth)

Residence Inn by Marriott  
1 International Dr, Portsmouth, NH 03801  
866-430-2692  
[www.marriott.com](http://www.marriott.com)  
(at Pease International Tradeport)

Holiday Inn  
300 Woodbury Ave, Portsmouth, NH 03801  
800-315-2621  
[www.holidayinn.com](http://www.holidayinn.com)