Emulsion Polymers Consulting and Education, LLC presents:

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

NASA Website Photo

A 2-hour, On-line Tutorial
June 12, 2025

Faculty
Donald C. Sundberg, PhD
Michael F. Cunningham, PhD

* Emulsion Polymers Consulting and Education (EPCEd) has a curriculum of 21 tutorials, treating both *fundamental* science/engineering topics and others treating *specialized topics*.

TUTORIAL OBJECTIVES: This tutorial 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. Non-equilibrium morphologies and emulsion polymerization kinetics are treated through first principles. Analytical characterizations of particle structures are introduced.

INTENDED AUDIENCE: This tutorial has been designed as an introduction to this topic for those who have some experience with emulsion polymerization and are interested in structured latex particles, but without substantial background in that subject. By developing a background in these subjects, participants will then be positioned to more effectively work with the many challenges involved in creating core-shell and other structured latex polymers.

STRUCTURE OF THE WORKSHOP: This on-line tutorial will be presented during a 2-hour period starting at 9:30 AM (EDT) on June 12, 2025. Participants will have received printed, personalized workbooks (full color copies of all the PPT slides) prior to the date of the on-line session. Questions can be placed in the on-line Chat Box and discussed in a 30- minute session immediately following the formal presentation.

WORKSHOP OUTLINE: See next page for a topical outline. Faculty profiles follow on page 3.

REGISTRATION INFORMATION

The registration fee includes the full book of tutorial slides delivered to the registrant's home or business address. Presentations will be made on-line via Microsoft Teams. ***Early registration is recommended*** due to the tutorial size limitation of 30 participants.

Registration Fee: ***$425 USD***
Registration Form --> Go to page 4

Contact for further information:
info@epced.com

Core-Shell Latex Particles- Fundamental Aspects of Morphology Control

1.) Examples of complex, composite particles, including hybrid latexes. *Core-shell, inverted core-shell, occluded, non-spherical, etc.*

2.) Fundamental science controlling structures – thermodynamic equilibrium based on interfacial free energies. *Water/polymer and polymer/polymer interfaces, effects of polymer polarity and surfactant levels. Minimization of free energies.*

3.) Radical entry to particles and diffusion within the particles. *Aqueous phase reactions to create oligomeric radicals, adsorption on particle surfaces, penetration of radicals into the particles and diffusion within the particles, propagation and termination reactions.*

4.) Kinetically controlled structures – phase separation and polymer chain diffusion during and after polymerization. *Diffusion of polymer chains in particles, thermodynamic conditions for phase separation, effect of glass transitions temperatures relative to reaction temperature, starve-fed effects.*

5.) Sequence of molecular events necessary to achieve final morphology – morphology matrix. *Introduction to decision matrix to anticipate type of morphology to be expected.*

6.) An introduction to analytical characterization of particle structures – chemical, thermal and microscopic techniques. *DSC, DMA, SEM, TEM, AFM, MFFT, surfactant titration.*

7.) Commercial applications of morphologically complex latex particles. *Advanced waterborne coatings, impact modifiers, rheology modifiers.*

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Faculty Profiles

Professor Donald C. Sundberg has been working in the field of emulsion polymers for more than 55 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 over 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 26th 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 Michael F. Cunningham has an extensive background in dispersed phase polymerizations, including suspension, emulsion, miniemulsion and dispersion polymerization. He received a bachelor's degree in Engineering Chemistry from Queen's University (Kingston, Ontario, Canada) and his Ph.D. from the University of Waterloo. He spent six years working on dispersed phase polymerizations in the Xerox Corporate Research Group, acquiring experience in process scaleup and technology transfer to manufacturing. He has an active research program in polymer colloids and emulsion polymerization, particularly in the area of living radical polymerization and stimuli-responsive particles, publishing over 250 peer reviewed publications, and holding 26 U.S. patents. He is secretariat of the International Polymer Colloids Group, and previously held the Ontario Research Chair in Green Chemistry and Engineering. He has consulted with a number of companies in the area of emulsion and suspension polymerization, and lectured for over 10 years at industrial short courses on emulsion polymerization in the USA and Switzerland. He is a Partner with Professor Sundberg in the international consulting firm Emulsion Polymers Consulting and Education, LLC.

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On-line Tutorial
June 12, 2025

Registration Form

Name_____
Mailing Address (for shipping workbook)_____
_____
City/State_____
Postal Code_____
Country_____
Position or Title_____
Organization_____
E-mail_____

The cost of this tutorial is $425 (USD). There is a <u>non-refundable</u> fee of $60 (USD). Cancellation of registration can be made up until May 12, 2025 with a full refund <u>less</u> the $60 processing fee.

<u>Method of Payment</u>:

- Credit Card (We accept Visa, MasterCard, American Express)

  ***Please use this secure link to SwipeSimple to pay by credit card*:**

  https://swipesimple.com/links/lnk_ba669232e8cd10ce5c6f65ef368e1478

- Wire transfer from bank --- Please go to info@epced.com and request banking instructions.

- Company check (make payable to Emulsion Polymers Consulting and Education, LLC, 39 Nute Road, Madbury, NH 03823, USA)

Please submit this registration form as an attachment to <u>info@epced.com</u> This registration form may serve as an invoice for those who register.