Emulsion Polymers Consulting and Education, LLC presents

*Measuring Glass Transitions (Wet and Dry) and Polymer-Polymer Phase Separation in Complex Latex Particles **

A Pair of Galactic Cornucopia (Webb + Chandra)

A 2-hour, On-line Tutorial
October 15, 2026

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: Despite having been practiced at commercial scale for more than a century, emulsion polymerization is increasingly the preferred reaction process used to create complex polymers of composite phase structure as aqueous based dispersions. Learning to control the copolymer chemistry to achieve desired levels of physical properties for many applications requires trustworthy analytical techniques to measure molecular parameters that relate to those properties. Advances in thermal analysis techniques such as differential scanning calorimetry (DSC) offer easily accessible data sets to aid in such materials development.

INTENDED AUDIENCE: This tutorial has been designed to introduce those interested in applying sophisticated thermal analysis techniques to measure the physical chemistry characteristics within complex latex polymer particles. Early stage and experienced scientists and engineers will likely see new options to investigate detailed thermal characteristics (T_g) of co- and terpolymers in both the wet and dry states, and to measure the degree of polymer-polymer phase separation in composite latex particles.

STRUCTURE OF THE TUTORIAL: This on-line tutorial will be presented during a 2-hour period starting at 9:30 AM (EDT) on October 15, 2026. Participants will have received PPT slides prior to the date of the on-line session. Questions can be placed in the on-line Chat Box during the session 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 tutorial PPT slide deck delivered to the registrant's email 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: *$450*** as shown on the Registration Form **(Page 4).** ***Contact info@epced.com for further information.***

Measuring Glass Transitions (Wet and Dry) and Polymer-Polymer Phase Separation in Complex Latex Particles

1.) ***Molecular viewpoint of the glass transition – segmental motion***
Specific volume and heat capacity changes through the glass transition. Empirical descriptions of T_g

2.) ***Techniques to measure T_g***
DMA (dynamic mechanical analysis), DSC (differential scanning calorimetry), MFFT (minimum film formation temperature). Sample preparation, calibration, output data

3.) ***Emphasis on DSC – heat capacity***
ΔC_p over the glass transition, literature values, transforming data output to differential of heat capacity with temperature, "base line", characteristics of transition peak shape

4.) ***Single phase polymers***
Homo- and copolymers, dC_p/dT curves, baseline differences, peak analyses, breadth of peak as evidence of copolymer composition distribution

5.) ***"Wet T_g"***
Techniques to measure wet T_g in latex and in water swollen films, plasticizing effect of water, plasticization by organic solvents

6.) ***Composite polymers basics***
Conceptual aspects of phase structure possibilities in composite latex particles, interfacial polymer between phases, driving forces for phase separation during and after polymerization

7.) ***Measuring degree of phase separation in composite latex particles***
Sample preparation for DSC analysis. Analysis of the interfacial signal to judge extent of phase separation, thermal annealing in the DSC to achieve "equilibrium" phase separation, examples of experimental composite latex samples with complete DSC analyses

8.) ***Lessons learned and take-home messages***

Faculty Profiles

Professor Donald C. Sundberg has been working in the field of emulsion polymers for 54 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. 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 chair of the International Polymer Colloids Group, and holds the Donald and Sarah Munro Chair in Engineering and Applied Science. He has consulted with a number of companies in the area of emulsion and suspension polymerization, and lectured for over 20 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.

Measuring Glass Transitions and
Polymer-Polymer Phase Separation
In Composite Latex Particles

On-line tutorial
October 15, 2026
Registration Form

Name_____
Address_____
_____
City/State_____
Postal Code_____
Country_____
Position or Title_____
Organization_____
E-mail_____
Phone_____

The cost of this tutorial is $450 (USD). There is a <u>non-refundable</u> fee of $60 (USD). Cancellation of registration can be made up until September 15, 2026 with a full refund less a $60 processing fee.

<u>Method of Payment</u>:

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

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

https://swipesimple.com/links/lnk_9b5acaa419477ffa9a95e7091e249fab

- 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.