



Emulsion Polymers Consulting  
and Education, LLC presents

***Rheology Fundamentals &  
Applications for Synthetic  
Latex and Associated Coating  
Formulations\****



***Three-Day Interactive Workshop  
October 27-29, 2014  
San Diego Training and Conference  
Center  
San Diego, California***

***Faculty  
Donald C. Sundberg, PhD  
Raymond H. Fernando, PhD***

\* Emulsion Polymers Consulting and Education (EPCEd) has a curriculum of 10 interactive workshops under the umbrella of the Science and Technology of Emulsion Polymers, or STEP<sup>n</sup>. This workshop is STEP<sup>9</sup>.

**OBJECTIVES:** Provide industrial scientists and engineers with an intensive, interactive workshop on the rheological characteristics of synthetic latices as they are produced via the emulsion polymerization process. The addition of such latices to coating formulations with pigments, fillers and rheological modifiers provides the participant an opportunity to grasp the fundamental rheological principles of these highly dispersed, fluid systems.

**INTENDED AUDIENCE:** This workshop is directed towards those in industry who use laboratory, pilot and/or commercial scale reactors to make latex for use in coating formulations, pressure sensitive adhesives, caulks and sealants. In equal measure it is also directed towards those who purchase latex for use in their own formulated dispersions for similar applications.

**STRUCTURE OF THE WORKSHOP:** This 3-day workshop will be conducted in a ***highly interactive manner*** with participants being engaged in discussions, demonstrations, problem solving and case studies.

**WORKSHOP OUTLINE:** See next page for complete, daily schedule of topics. Faculty profiles follow on page 3.

**REGISTRATION INFORMATION**

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

Registration Fee: \$1650 USD  
Registration Form – [Click here](#)

**Contact for further workshop information:**  
[info@epced.com](mailto:info@epced.com)

**HOTELS, TRAVEL, LOCAL ATTRACTIONS**

The San Diego Training and Conference Center (SDTACC) is partnered with several close-by and well-appointed hotels, and has procured special rates for workshop participants. For links to these hotels, travel directions, parking and local attractions, go to <http://sandiegotacc.com/> or call SDTACC directly (619.235.8600) for details and assistance.

**Rheology Fundamentals & Applications**  
**for Synthetic Latices and Associated**  
**Coating Formulations**

**Day 1**

**AM:** 8:30 AM to Noon

- Basics of creating and characterizing synthetic polymer latices
  1. Particle nucleation and growth
  2. Control of polymer composition, MW, gel content
  3. Functional additives (esp. vinyl acids) and neutralization
  4. Colloidal stability
  5. Measurement of particle size, glass transitions, MFFT, acid distribution
- Basics of fluid rheology, including polymer solutions
  1. Newtonian, shear-thinning, shear-thickening fluids
  2. Thixotropy, rheopexy
  3. Viscoelasticity
  4. Shear versus extensional deformation

**PM:** 1:15 to 5:00 PM

- Rheology of simple dispersions (volume fraction, particle size, temperature)
- Non-Newtonian behavior, structure development at high volume fraction
- Rheology of bimodal and multimodal dispersions
- Introduction of non-spherical particles

**Day 2**

**AM:** 8:30 AM to Noon

- Latex particle-particle interactions, DLVO approach, water soluble materials inherent in latex polymerization
- Surface region of latex particles, hairy layers, effective size
- Role of “functional additives” (e.g. vinyl acids), neutralization, polyelectrolytes, water swelling of latex particles
- Formulated systems
  1. Binders, pigments and fillers
  2. PVC, CPVC, NVV
  3. Coating life—cycle

**Day 2**

**PM:** 1:15 to 5:00 PM

- Coating ingredient effects on rheology
  1. Simple thickeners, rheology modifiers
  2. Associative thickeners
  3. Dispersants and others additives
  4. Interaction with latex surfactants
- Mixing and storage of formulated latex products
  1. Mechanical effects
  2. Heat-thaw effects
  3. Phase separation (syneresis), entropic flocculation

**Day 3**

**AM:** 8:30 AM to Noon

- Interactions between latex particles, pigments, fillers, and other additives
  1. Effects on coating formulation properties
  2. Effects on dry film physical properties
- Applying latex based dispersions
  1. Substrates effects
  2. Shear rates relevant to various application methods
  3. Extensional viscosity and normal stresses
- Flow and leveling after application

**PM:** 1:15 to 4:30 PM

- Film formation mechanisms
  1. Latex packing and particle coalescence
  2. Single and multiple phase particles
  3. Coalescing aids
  4. Low and “zero” VOC formulations
- Applications to Latex paints, Paper coatings, Pressure sensitive adhesives
- Problem solving sessions throughout workshop
- Course summary and review

## Faculty Profiles

**Professor Donald C. Sundberg** has been working in the field of emulsion polymers for 47 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 spent 5 years working on impact modifiers for ABS resins with the Monsanto Company prior to pursuing a career in the university setting. 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 he has presented many conference papers. In addition he has conducted many workshops, most notably the one on latex particle morphology control, now in its 10<sup>th</sup> annual offering. He spent a sabbatical year at the Institute for Surface Chemistry in Stockholm and was Chair of the Gordon Research Conference on Polymer Colloids. He maintains active research interests in polymerization kinetics in solution, bulk and emulsion systems, interfacial science and polymer morphology control, diffusion in polymers, microencapsulation, coatings, and controlled release technology. 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 Raymond H. Fernando** has been the Arthur C. Edwards Endowed Chair and Director of Polymers and Coatings Program within the Department of Chemistry and Biochemistry at California Polytechnic State University since 2002. He received his Ph.D. in 1986 from North Dakota State University in Polymers and Coatings, emphasizing studies in the coating rheology field. He has fifteen years of industrial experience in coatings, with extensive knowledge in waterborne technology. He was a Lead Research Scientist in R&D at Air Products and Chemicals, involved with the rheology of a wide range of coatings and adhesives, coatings for electronics, and nanocomposites, and was a Program Manager for Armstrong World Industries, running the coating research program that supports global manufacturing and marketing needs of Armstrong Building Products Division. His current research at Cal Poly includes understanding nanoparticle reinforcements of coatings, impact of coating raw materials on rheology, and low VOC coatings. Dr. Fernando has many publications and patents, and has given numerous lectures and presentations related to coatings science and technology. He received the Federation of Societies for Coatings Technology President's Award in 2005.

## Registration Form

### *Rheology Fundamentals and Applications for Synthetic Latices and Associated Coating Formulations*

San Diego, CA USA

October 27-29, 2014

Name \_\_\_\_\_

Address \_\_\_\_\_

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

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

Country \_\_\_\_\_

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

Organization \_\_\_\_\_

Phone \_\_\_\_\_

Fax \_\_\_\_\_

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

### **Participant Category**

Standard price for industrial participant: \$1650 (USD)

Discounted price for additional participant(s) from the same company: \$1550 (USD)

Academic participant: \$1450 (USD)

***There is a non-refundable fee of \$50 (USD). Cancellation of registration can be made up until September 27, 2014 with a full refund less the \$50 processing fee.***

### **Method of Payment:**

Credit Card

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

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

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

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

Signature \_\_\_\_\_

Credit Card billing address (if different than above):

\_\_\_\_\_

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

**For a secure eCommerce transaction, FAX this completed form to EPCEd at 1-603-343-4015, or call 1-603-742-3370.**