

REGISTRATION FORM (deadline for registration August 16, 2021)

Mr., Ms., Dr., Prof. (circle one)

First Name: _____

Family Name: _____

Organization/Institution: _____

VAT Number/Tax Id. Number of your company: _____

Address: _____

Postal Code: _____

City: _____ Country: _____

E-mail: _____

Phone: _____

FEES (Early registration till August 16, 2021)

On-line attendance _____ 1,000 €

Late registration (after August 16, 2021) will have a charge of 100 € in the registration fee.

METHOD OF PAYMENT

Bank transfer

Payment by credit card is not accepted.

Emulsion polymers are truly “products by process” materials, whose properties are determined during the polymerization process. The course will focus on the understanding of the fundamental basis of emulsion polymerization and on the use of this understanding to manipulate process conditions to achieve a consistent production of improved products. The fundamentals of latex rheology and film formation, key aspects in the application of emulsion polymers will also be studied.

For more information, please contact:

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Or visit our web site (including on-line registration):

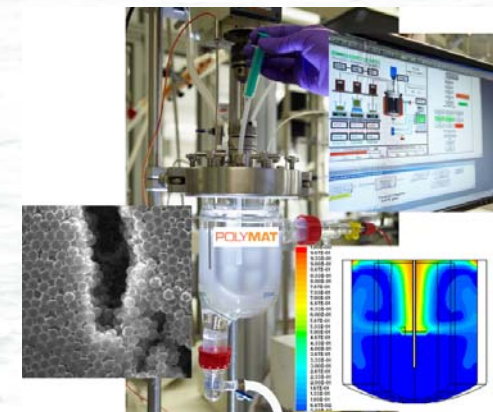
<http://www.ehu.eus/en/web/polymat/epp-course>



Universidad
del País Vasco

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POLYMAT



Course on

**EMULSION POLYMERIZATION
PROCESSES**

September 13-October 18, 2021

Letter from the Organizing Committee:

Dear All,

As you are all aware, the COVID-19 pandemic has caused significant disruption to our day-to-day lives and this course is not different. Therefore, the course will be given on-line over 6 weeks (one day per week), starting the 13th of September.

PROGRAM AND COURSE OUTLINE

Monday, September 13, 2021

14.00-15.30 Features of Emulsion Polymerization (Prof. José M. Asua, POLYMAT)

Processes occurring in emulsion polymerization. Similarities and differences with other polymerization techniques in dispersed media (miniemulsion, microemulsion and dispersion polymerization). Reactors. Applications of polymer dispersions.

15.30- 16.00 Break

16.00-17.30 Kinetics of Emulsion Polymerization (Prof. José M. Asua, POLYMAT)

Factors affecting polymerization rate. Radical entry: processes involved; effects of water solubility of monomers and initiators, characteristics of the surface of the polymer particles. Radicals exit: processes involved; factors affecting radical exit (water solubility of monomers and initiators, particle size, characteristics of the surface of the polymer particles). Radical termination. Average number of radicals/particle. Monomer partitioning: thermodynamically controlled systems; mass transfer limitations.

Monday, September 20, 2021

14.00-16.00 Stability of Polymer Colloids (Prof. José M. Asua, POLYMAT)

Colloidal stability. Mechanisms affecting dispersion stability. Electrostatic stabilization. Overcharging. Steric stabilization. Total potential energy of interaction. Flocculation of systems sterically stabilized. Electrosteric stabilization. Aggregation kinetics.

16.00-16.30 Break

16.30-17.30 Seminar on kinetic measurements (Dr. Nicholas Ballard, POLYMAT)

How to run an experiment. Determination of kinetic measurements from experiments.

17.30-18.30 Particle Nucleation and Particle Size Distribution (Prof. Radmila Tomovska, POLYMAT)

Description of the mechanisms for particle nucleation. Particle size distribution. Effect of the formulation and process conditions.

Monday, September 27, 2021

14.00-15.00 Miniemulsion Polymerization (Prof. José M. Asua, POLYMAT)

Scientific basis for the preparation of monomer miniemulsions: homogenization; thermodynamic and kinetic stabilization. Effect of preparation conditions and of the miniemulsion formulation on the polymerization. Applications.

15.00-16.00 Latex Rheology (Dr. Nicholas Ballard, POLYMAT)

Key aspects affecting the viscosity of waterborne polymer dispersions.

Equations for dispersion viscosity Thickeners.

16.00-16.30 Break

16.30-18.00 Molecular Weight Distribution (Prof. Jose R. Leiza, POLYMAT)

Introduction. MWD in linear polymerization: Rigorous modelling compartmentalization, MWD for a 0-1 system. MWD in non-linear systems: computation of sol MWD and gel content. Numerical and experimental examples.

Monday, October 4, 2021

14.00-15.30 Seminar on Latex Characterization (Prof. Jose R. Leiza, POLYMAT)

Copolymer composition. Molecular weight distribution. Gel content. Crosslinking density.

15.30-16.30 Particle Morphology (Prof. Radmila Tomovska, POLYMAT)

Thermodynamic and kinetic aspects for particle morphology control.

16.30-17.00 Break

17.00-19.00 Advanced Research Topics: Bases and Applications of CFRP in Dispersed Media (Dr. Franck D'Agosto. CNRS, Laboratoire de Chimie et Procédés de Polymérisation) Bases and applications of controlled/living radical polymerisations (CFRP). Challenges for adapting CFRP to water dispersions. Emphasis on future opportunities and open issues.

Monday, October 11, 2021

14.00-16.00 Emulsion Polymerization Reactors (Prof. María Paulis, POLYMAT)

Reactor types. Reactor equipment for mixing. Power consumption. Agitation requirements for emulsion polymerization. Mass transfer limitations. Heat transfer. Predicting the performance of emulsion polymerization reactors: Mass, energy and population balances. Evolution of characteristics in the different operation modes. Determination of safety parameters. Scale up. Residual monomer removal: devolatilization and postpolymerization.

16.00-16.30 Break

16.30-17.30 On-line Monitoring (Prof. Jose R. Leiza, POLYMAT)

Sensor selection. Latex gas chromatography. Head-Space gas chromatography. Densimetry. Ultrasound. Spectroscopic techniques. Reaction calorimetry. Raman vs calorimetry. Experimental results.

17.30-18.30 Control of Emulsion Polymerization Reactors (Prof. Jose R. Leiza, POLYMAT)

Open-loop and close-loop strategies. Close-loop for linear polymers: Optimal trajectories; Examples of safe optimal control of composition and MWD; Final property control. Unsolved issues in closed-loop control.

Monday, October 18, 2021

14.00-16.00 Waterborne polymer/inorganic hybrids (Prof. Elodie Bourgeat-Lami, CNRS, Laboratoire de Chimie et Procédés de Polymérisation)

Overview of the basic principles and main synthetic procedures involved in the synthesis of organic/inorganic colloid through heterophase polymerization. Recent advances on the control of particles morphology and polymerization kinetics. Typical examples including the incorporation of titanium dioxide, silica, magnetic particles and clay colloids into polymer particles.

16.00-16.30 Break

16.30-18.30 Film Formation of Waterborne Coatings (Prof. María Paulis, POLYMAT)

Stages of film formation: drying, particle deformation and interdiffusion. Fundamental driving forces for particle coalescence. Introduction to key analytical techniques and review of experimental results.

18.30 End of the course

PARTICIPANTS

The course is designed for scientists and engineers from industry and academia actively interested in emulsion polymerization. English will be the official language of the course.

LOCATION

The course will be given on-line by Blackboard Collaborate (BBC) platform. Each participant will receive a personal link to access to the course. Google Chrome browser is preferred to access to the BBC platform. The participants will be able to ask questions during the lectures through the BBC platform, provided that they have a microphone in their devices.

COURSE FEES

The on-line fee will be 1,000 € Company members of the Industrial Liaison Program in Polymerization in Dispersed Media may register two people free of charge. Additional personnel from these companies may also register at half of the regular fee.

PAYMENT METHOD

The payment of the course fee will be made by bank transfer to "POLYMAT-Ingeniería Instituto Materiales Poliméricos", ES65 2095 0292 9010 6157 2763 (Bank: "KUTXABANK", C/Getaria 9-11, 20005 Donostia-San Sebastián, Spain) with the SWIFT code: BASKES2BXXX. Please reference your name and the full name of your company and fax a copy of the bank transfer paper to us.