opportunities for employment. Consequently, graduates can find excellent
some considerable effort is made to relate the research results
Industrial Liaison Program as well as government agencies. Hence
organizations through their membership in the Emulsion Polymers
Research support for institute activities is obtained from industrial
developing countries, and alternative water disinfection technologies.
particles could benefit research on the sources, fate and transport
media. Similarly, model porous media constructed by engineered
bioenergetics, and bacterial transport through unsaturated porous
relationships between bacterial adhesion to a surface and cellular
particle technology for contaminant remediation in water, tailor-made
separations. In the environmental area, in addition to seeking novel
theories at scales available to experimentalists. In the biotechnology
institutions have allowed for the validation of soft condensed matter
addition, engineered particle technologies developed at EPI and other
materials that depend on the nanoscale features of its constituents. In
researchers are designed to function either as nano- or microscale
sensors, material modifiers, or to self-assemble into advanced
materials that depend on the nanoscale features of its constituents. In
in addition, engineered particle technologies developed at EPI and other
institutions have allowed for the validation of soft condensed matter
theories at scales available to experimentalists. In the biotechnology
area, research focuses on diagnostic and therapeutic technology to
prepare particles that are biocompatible, biologically specific, easily
detectable, and responsive to external controls. In the area of energy,
work focuses on a variety of different unique particle technologies that
may be used in applications such as catalysis and photocatalysts for
the hydrogen economy, photovoltaics and solar cells, and membrane
separations. In the environmental area, in addition to seeking novel
particle technology for contaminant remediation in water, tailor-made
colloidal particles with desirable surface properties, should provide
model systems for fundamental insight into surface phenomena,
relationships between bacterial adhesion to a surface and cellular
bioenergetics, and bacterial transport through unsaturated porous
media. Similarly, model porous media constructed by engineered
particles could benefit research on the sources, fate and transport
of bacteria in the environment, new water treatment technologies for
developing countries, and alternative water disinfection technologies.
Research support for institute activities is obtained from industrial
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Industrial Liaison Program as well as government agencies. Hence
some considerable effort is made to relate the research results
to industrial needs. Consequently, graduates can find excellent
opportunities for employment.

Emulsion Polymers Institute

111 Research Drive; 610-758-3602
H. Daniel Ou-Yang, Ph.D., director; Eric S. Daniels, Ph.D.

Originally established in 1975, the Emulsion Polymers Institute (EPI),
provides a focus for graduate education and research in polymer
colloids. Formation of the institute constituted formal recognition of
an activity that had grown steadily since the late 1960s. Recently,
the research thrust of the Institute has been broadened to include
engineered particles. The new focus is rooted in fundamental
scientific-based particle design, but guided by identified applications,
while still maintaining a core competency in emulsion polymerization.
The rapidly broadening applications for particle technologies in fields
such as biotechnology (e.g., drug delivery, imaging, assembly of
biocompatible scaffolds), nanotechnology (e.g., directed assembly of
hierarchically ordered, functional structures), and others demand a
concomitant diversification of the Institute to include a broader class
of particles: polymeric, inorganic, hybrid, macroionic, metallic, as well as
novel particulate composites designed at the nanoscale that will span
all industrially-relevant scales.

The institute has close ties with polymer and surface scientists
in the Center for Polymer Science and Engineering (CPSE),
Center for Advanced Materials and Nanotechnology (CAMN),
and the departments of chemical engineering, chemistry, physics,
and materials science and engineering. These ties reflect the
interdisciplinary nature of research that is carried out in the Institute.

RESEARCH ACTIVITIES
Fundamental particle research in the institute spans particle synthesis,
particle functionalization, and directed assembly of particles into
higher order, functional structures. Continuing emulsion polymers
research is a blend of theoretical and experimental problems
related to the preparation, characterization, and applications of
polymer latexes and are aimed at understanding the kinetics,
mechanisms, morphology, and the colloidal, surface and bulk of
the latexes. Applications of this fundamental technology, resulting
from interdisciplinary research among the faculty associated with
the institute, stand to align well with the strategic university and
college-level nanotechnology, biotechnology, and energy/environment
initiatives. Many projects within EPI achieve what has been the largest
obstacle to commercialization of nanotechnology: scalable process
design of nanoscale functioning materials. Materials fabricated by EPI
researchers are designed to function either as nano- or microscale
sensors, material modifiers, or to self-assemble into advanced
materials that depend on the nanoscale features of its constituents. In
addition, engineered particle technologies developed at EPI and other
institutions have allowed for the validation of soft condensed matter
theories at scales available to experimentalists. In the biotechnology
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media. Similarly, model porous media constructed by engineered
particles could benefit research on the sources, fate and transport
of bacteria in the environment, new water treatment technologies for
developing countries, and alternative water disinfection technologies.

EDUCATIONAL OPPORTUNITIES
Graduate students in the Institute undertake dissertation research
leading to the master of science or doctor of philosophy degree in
existing science and engineering curricula or in the Center for Polymer
Science and Engineering. Programs of study are tailored to meet
the individual needs of each student and considerable flexibility is
permitted in the selection of courses and a research topic. Educational
and research opportunities exist for postdoctoral scholars and visiting
scientists as well as resident graduate students. In addition, the
Institute holds a short course each June, “Advances in Emulsion
Polymerization and Latex Technology” that typically attracts a number
of industrial participants as well as EPI students and is an excellent
opportunity to interact with industrial scientists and engineers.

For more information, write to H. Daniel Ou-Yang, Emulsion
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Drive, Bethlehem, PA 18015. Please visit our web site at http://
www.lehigh.edu/~inemuls/epi/ for further details.