

## University of California Toxic Substances Research & Teaching Program

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## Green Chemistry: a science & education perspective

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- The data, safety and technology gaps presented by chemicals in commerce present significant hurdles to the implementation of green chemistry principles
- Understanding problems posed by toxic chemicals and developing solutions are interdisciplinary activities
  - Chemistry/Biology/Engineering/Economics/Risk Assessment/Policy
- Our system of higher education & research, however, is largely organized around individual disciplines (the “Silo” effect)
  - Faculty are typically not rewarded for working outside of their discipline
  - Peer review of interdisciplinary research proposals can be difficult
- New paradigms for education and research are needed to solve these problems
  - UC supports a multi-campus research program to stimulate and lead interdisciplinary research in toxic substances



# The UC Toxic Substances Research & Teaching Program

Responding in 1985 to an initiative from the State of California Legislature, the University of California developed this coordinated program of research and teaching to address the many issues associated with toxic substances in the environment

- The TSR&TP supports research and graduate education to provide the new concepts and scientific talent that are essential to solving the problems of toxic chemicals in our environment
  - ✓ Emphasis on interdisciplinary research
- Executive & Advisory Committees are used to direct faculty and students to state and national needs
- Web: <http://tsrtp.ucdavis.edu>
  - ✓ Toxics Directory: database for expertise in the UC system
  - ✓ Searchable database for research projects

## Responsiveness to existing and emerging issues

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### ◆ MTBE

- Senate request for UC to provide the Governor with a comprehensive evaluation and recommendation within 10 months
- Report was submitted to the Governor in November, 1998 (<http://tsrtp.ucdavis.edu/mtberpt/homepage.html>)
- In 1999, the Governor ordered the phase out of MTBE from gasoline in California

### ◆ Nanotoxicology Research & Training Program

- Multi-campus center of excellence for nanomaterial engineering and toxicology research
- Goal is to ensure that the next generation of scientists and engineers will be prepared to meet the health assessment demands of a rapidly evolving world of nanomaterials development
- <http://www.cnsi.ucla.edu/staticpages/education/nanotox-program>

# The UC TSR&TP supports two additional centers of excellence for research on the impacts of toxic substances on human & environmental health

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## ◆ Nanotoxicology Research & Training Program

- Goal is to ensure that the next generation of scientists and engineers will be prepared to meet the health assessment demands of a rapidly evolving world of nanomaterials development

## ◆ Toxic Mechanisms

- Goal is to identify mechanisms of toxic actions and to improve risk assessment and to provide a means for preventing or treating toxic conditions

## ◆ Aerosols & Health

- Goal is to transform air quality graduate education by integrating policy, engineering, and science

## **Green Chemistry: examples of TSR&TP-funded research relevant to closing the data, safety and technology gaps**

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- **Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation**
- **Managing Toxic Metals in Electronic Waste: Future Implications of Alternative Policies for the Health, Environment, and Economy Sectors in California**
- **A Unit Process Model-Based Approach to Green Design and Manufacturing Decision Support**
- **Broadening Environmental Policies to Green Industrial Behavior**
- **Doing Justice to Science: A Critical Study of Scientific Arguments During the Negotiation of the Stockholm Treaty on Persistent Organic Pollutants**
- **Environmental and Economic Model and Tool for Systems Analysis of Plastics Recycling from End-of-life Computers in California**
- **Green Catalytic Chemistry with Hydrogen Peroxide**

## Green Chemistry in California

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- **The scale of the problem is overwhelming - prioritization is essential**
- **Opportunities exist to leverage other State mandated activities**
  - **e.g., California Environmental Contaminant Biomonitoring Program (SB 1379)**
  - **Potential for identifying priority compounds**
- **Collaboration between UC, State agencies and industry is required**
  - **Hazardous waste source reduction (SB 1916)**
  - **Department of Toxic Substances Control, Chemical Industry Council of California, and UC**
  - **Project: “Challenges, opportunities and methods: pollution prevention in the California chemical industry”**