Educational Activities

NSEC Advisory Board Meeting
14 April 2003
Making connections

**EDUCATION**
- K-12 Students
- General Public

**RESEARCH**
- Teachers
- Graduate Students
- Industrial Partners
- UG Students

FACULTY

UG STUDENTS

GRADUATE STUDENTS

INDUSTRIAL PARTNERS

GENERAL PUBLIC

K-12 STUDENTS
Making connections

EDUCATION

- K-12 STUDENTS
- GENERAL PUBLIC
- UG STUDENTS

RESEARCH

- TEACHERS
- FACULTY
- GRADUATE STUDENTS
- INDUSTRIAL PARTNERS

Research
Making connections

EDUCATION

K-12 STUDENTS

GENERAL PUBLIC

RESEARCH

TEACHERS

FACULTY

GRADUATE STUDENTS

INDUSTRIAL PARTNERS

UG STUDENTS

Research

Research

Research

interns
Making connections

EDUCATION

K-12 STUDENTS

GENERAL PUBLIC

RESEARCH

TEACHERS

GRADUATE STUDENTS

INDUSTRIAL PARTNERS

FACULTY

UG STUDENTS

Research

Research

Research

interns

Making connections
Making connections

EDUCATION

K-12 STUDENTS

TEACHERS

FACULTY

UG STUDENTS

GENERAL PUBLIC

RESEARCH

GRADUATE STUDENTS

INDUSTRIAL PARTNERS

Research

RET

GK12

Research

Research

interns

REU
Making connections

EDUCATION
- K-12 STUDENTS
- TEACHERS
- FACULTY
- UG STUDENTS
- GENERAL PUBLIC

RESEARCH
- GRADUATE STUDENTS
- INDUSTRIAL PARTNERS

Connections:
- RET
- GK12
- Teach
- Research
- REU
- interns
Making connections

EDUCATION

- K-12 STUDENTS
- GENERAL PUBLIC
- TEACHERS
  - RET
  - Teach
  - REU
  - lectures

RESEARCH

- GRADUATE STUDENTS
- INDUSTRIAL PARTNERS
- UG STUDENTS
  - GK12
  - Research
  - Research
  - interns

FACULTY

- RET
- Research
Science presentations
Science presentations
Workshops for teachers

- Concept Tests
- Feedback
- Problem with Problems
- Discussion
GK-12 Fellows Program
GK-12 Fellows Program
Research Experience for Undergraduates (REU)

- Summer research projects for undergraduates
- Matching funds provided DEAS and College
- Interdisciplinary research environment
- Use of shared experimental facilities
Research Experience for Teachers (RET)

- Summer project for teachers
- Direct exposure to research environment
- Development educational activities
- Joint activities with REU participants
Nadya Mason
Harvard College, Stanford University
Junior Fellow
Jim McNeil
Geology
Middle School

Project (Stone Group):
Research: Effect of bubble size on foam drainage
Tanya Hadzic
Eckerd College
Now: University of Iowa (Immunology)

Project (Whitesides group):
Research: Self-assembly of mesostructures
Design and Self-Assembly of Open, Regular, 3D Mesostructures

Tricia L. Breen, Joe Tien, Scott R. J. Oliver, Tanja Hadzic, George M. Whitesides

Self-assembly provides the basis for a procedure used to organize millimeter-scale objects into regular, three-dimensional arrays (“crystals”) with open structures. The individual components are designed and fabricated of polyurethane by molding; selected faces are coated with a thin film of liquid, metallic alloy. Under mild agitation in warm, aqueous potassium bromide solution, capillary forces between the films of alloy cause self-assembly. The structures of the resulting, self-assembled arrays are determined by structural features of the component parts: the three-dimensional shape of the components, the pattern of alloy on their surfaces, and the shape of the alloy-coated surfaces. Self-assembly of appropriately designed chiral pieces generates helices.
Design and Self-Assembly of Open, Regular, 3D Mesostructures

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Kristy Lenihan
Physics
High School

Project (Mazur Group):
Research: Micromachining of transparent materials
Education: Development of optics curriculum
FCI data

2000 FCI combined

gain: 22%
FCI data

traditionally taught courses

\[ g = \frac{S_f - S_i}{1 - S_i} \]

change in score, $S_f - S_i$ (%)

$g = \frac{S_f - S_i}{1 - S_i}$

Andrea Kurtz
Harvard College
Now: Stanford University (Chemistry)

Senior Thesis (Hongkun Park):
Research: Colloidal nanotube catalysts
“communication is such a big part of science: in order to convey the interest in science you need to be able to present it clearly”
Conclusion

Educational activities:

- faculty commitment
- broad involvement
- diverse target audience
- high impact