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# PU heads up search for materials that mimic life

By: Lindsay Dell , Special Writer 09/27/2002

## Seeking substances that can alter their shape or repair themselves.

Princeton University is the directing member in a new coalition of research institutions sponsored by the National Aeronautics and Space Administration to produce materials for space-age applications that mimic biological processes.

In November, the Institute for Biologically Inspired Materials will begin work to engineer synthetic substances that are capable of such biological phenomena as self-repair and adaptation to changing environments. Application of these materials will range from spacecraft to civil aviation.

As part of its first planning meeting Wednesday, the university hosted representatives of the three research institutions that will be partners in the project: the University of California at Santa Barbara, Northwestern University and the University of North Carolina at Chapel Hill. While Princeton is responsible for coordinating the group of approximately 35 scientists, engineers and scholars that will comprise the institute, ICASE, a research institute run by the NASA Langley Research Center in Virginia, handles most of the oversight.

Tom Sutter, a NASA systems technology project manager, said the new institute represents an effort on NASA's part to establish long-term relationships with research institutions.

"We would like to make a lasting commitment to developing the materials that are essential to technological advancement," he said.

The institute's research and development will take place in the laboratories of the individual universities, with each one focusing on its relative specialty. At Princeton, more than half of the work will take place in the chemical engineering department, with the remainder divided between the chemistry and civil engineering departments.

According to Mr. Sutter, another of NASA's objectives in this collaboration is to develop and culture a future workforce that will be comfortable with these innovative materials. This strategy is embodied in the forthcoming education program to be initiated at North Carolina Agricultural and Technical State University.

Dr. Darrell R. Tenney, the director of Aerospace Vehicle Systems Technology at NASA's Langley Research Center, spoke of the institute's intention to combine physics, biology, chemistry and engineering to solve everyday civil aviation problems, such as reducing offensive noise and making flight more fuel-efficient.

"In the past, aircraft have always been designed with a solid structure," he said. "With this technology, we

can alter the shape of the craft in-flight to reduce noise and maximize lift."

For example, just as some shells and plants are able to repair themselves naturally through biological processes, the scientists will use electromechanical fields to engineer a synthetic material that will be capable of self-repair.

"We plan to make smart materials — ones that can respond to changes in their environments, and that can sense when they've been damaged, and respond," said Ed Samulski, a chemistry professor at the University of North Carolina at Chapel Hill, who earned his doctorate at Princeton.

NASA's initial commitment of funding is $3 million a year over the next 10 years. The institute is expected to attract additional income as private individuals and research institutions become interested in the group's developments.

According to Ilhan A. Aksay, a professor of chemical engineering at Princeton, the largest challenge facing the team is the actual creation of the biologically inspired materials.

"No one yet has made things that function like biological materials," he said.

For example, modifying an aircraft in-flight currently requires the addition of hydraulics, which adds a significant amount of weight, said Professor Aksay. In time, however, with the work of the institute, hydraulic material will be replaced by ultra-efficient biologically inspired material.

"Soon we will be able to visualize — and design — a plane that will fly like an eagle," he said.



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