

THE *Current*

December 5, 2013

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Bio-inspired Research Expands at UCSB with Army Funding Renewal

UC Santa Barbara's [Institute for Collaborative Biotechnologies](#) (ICB) has received an extension of its contract with the U.S. Army Research Laboratory-Army Research Office, providing an additional \$48 million over three years to support research that is inspired by biological systems. The continuation in ICB funding speaks to the success of a decade of fundamental research in the areas of biotechnology, chemistry, engineering, physics, materials science, computer science, neuroscience and medicine.

"This award extends the ICB contract forward, supporting dozens of existing projects and opening doors for several exciting, new projects," commented Frank Doyle, director of the ICB. "It is noteworthy that the Army continues to invest in the groundbreaking research conducted by the ICB, even in this time of uncertainty in federal funding."

Established in 2003, the ICB has received over \$118 million in funding from the Army during the past decade for bio-inspired research conducted at UC Santa Barbara, Caltech and MIT, often in collaboration with researchers from Army and industry laboratories. Over the past five years, the ICB has conducted an annual average of 50 research projects, produced more than 500 publications, and supported hundreds of graduate students who earned their doctoral and master's degrees.

“The common mission of the ICB is to use inspiration from biological systems to solve these basic challenges: How are materials designed in natural systems? How do organisms solve difficult networking problems? How are biological organisms made more resilient?” said Scott Grafton, ICB associate director.

The ICB supports basic research in six themes that, while stemming from very diverse disciplines, are inspired by examples in nature such as the structure of sea sponges, the intricacy of a moth’s eye, the adhesion of gecko feet, and the locomotive abilities of bipedal mammals (humans). These themes range from understanding complex biological systems on a cellular level, to engineering synthetic materials inspired by natural models.

“The unclassified research made possible by the ICB is 20 years ahead of its time and enables technological advances that will benefit society in many different ways,” said David Gay, ICB Director of Technology. “Over the past decade, funding from the Army has resulted in bio-inspired research results that have opened doors for applications in materials, biotechnology, sensors, network science, and cognitive neuroscience.”

For example, ICB researchers are working to understand how enzymes produced by plant fungi work on a molecular level. This basic research will enable them to engineer synthetic enzymes that can break down plant biomass for efficient biofuel production. An ICB study of the microscopic structure and properties of the gecko’s feet has led to reversible adhesion technology that can support weight while also offering an easy mechanism for release. In biomedical applications, researchers have developed a molecular sensor that can detect drug concentrations *in vivo* — which could lead to real-time measurement of the dosage and effectiveness of therapeutic drugs. By closely examining the design of mussel cuticles, ICB researchers are developing synthetic polymer materials with remarkable properties of both elasticity and toughness.

“The Institute for Collaborative Biotechnologies is the kind of collaborative research environment at UC Santa Barbara that allows faculty to amplify the impact of their research across broad frontiers of science, engineering, and technology,” commented Rod Alferness, dean of UCSB’s College of Engineering. “We look forward to continuing our productive partnership with the Army Research Laboratory and our academic and industry partners.”

“UC Santa Barbara continues to be on the forefront of research that is changing the world and I am pleased the Army has chosen to continue its partnership,” commented Rep. Lois Capps (D-Calif.), on the contract extension. “This contract extension will allow researchers at UC Santa Barbara and other world class universities to focus their resources on areas critical to the Army’s mission and this research will help our military remain at the forefront of innovation and biotechnologies.”

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.