



NYU

TANDON SCHOOL
OF ENGINEERING

PRESS OFFICE • 1 MetroTech Center, 19th Floor, Brooklyn, NY 11201

CONTACT • Kathleen Hamilton
646.997.3792 / mobile 347.843.9782
kathleen.hamilton@nyu.edu

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Immediate Release

New biomaterials inspired by nature's stickiest creatures are on the horizon

**NYU Tandon's Jin Kim Montclare wins Department of Defense funding for her work
with wet adhesion**

BROOKLYN, New York, Wednesday, June 26, 2019 – The first attempts have launched to bio-engineer proteins like those found in mussels and tree frogs to yield similar amazing wet adhesion in sealants, coatings, glues, and medical adhesives.

The [Army Research Office](#), an element of U.S. Army Combat Capability Development Command's Army Research Laboratory, recently awarded a three-year grant of \$400,000 for the project, led by NYU Tandon School of Engineering Professor of Chemical and Biomolecular Engineering [Jin Kim Montclare](#).

Crucial proteins in these particular animals exhibit unique behaviors and chemical reactivity. Montclare and her [team](#) are creating hydrogels that borrow certain key features of those proteins: the separation of a solution into two distinct liquids in response to external stimuli, the incorporation of nonstandard amino acids, and patterning, such as the polygonal pillars seen in the toe pads of tree frogs.

"We're employing strategies to control both the nano-scale conformational changes within the protein material and the micro-scaled patterns," Montclare explained. "The resulting set of proposed protein-engineered materials will bear insight into how we can impact the overall physicochemical properties while also developing novel biologically inspired adhesives. This research could have tremendous implications in biomedical applications relevant to the military and society as a whole and could later broadly impact products in diverse areas like biosensors, programmable devices, reconfigurable and self-healing materials, living-anti-corrosion paints, and robust human-machine interfaces, to name just a few."

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“Dr. Montclare aims to create artificial biological adhesives that controllably interface with non-living inorganic materials. This kind of responsive biological adhesive is particularly exciting, as it could be used for protective coatings that could extend the life of military vehicles or devices by eliminating contaminants that degrade paints or coatings,” said Dr. Stephanie McElhinny, Biochemistry Program manager at the Army Research Office. “This research effort also includes a strong collaboration at the Army Research Laboratory with Dr. Richard Fu, who will explore the ability to transfer extremely precise patterns of these protein-based adhesives to surfaces using specifically designed photomasks generated using ARL’s [Specialty Electronics Materials and Sensors Cleanroom \(SEMASC\) Facility](#).”

Earlier this year, the Department of Defense [funded](#) a new instrumentation system for her lab that will allow her to harness the most powerful methods of synthetic biology and protein engineering.

Montclare, who was recently inducted into the American Institute for Medical and Biological Engineering (AIMBE) College of Fellows, has been recognized for developing protein-lipid macromolecule systems that can deliver genes, nanoparticles, and drugs for the potential treatment of multi-drug resistant cancer cells, diabetes, and other conditions requiring a variety of therapeutic approaches. She has also made breakthrough strides in using engineered proteins to detoxify organophosphates, compounds commonly used in pesticides and warfare agents (such as sarin) that pose grave health hazards to people and animals.

About the New York University Tandon School of Engineering

The NYU Tandon School of Engineering dates to 1854, the founding date for both the New York University School of Civil Engineering and Architecture and the Brooklyn Collegiate and Polytechnic Institute (widely known as Brooklyn Poly). A January 2014 merger created a comprehensive school of education and research in engineering and applied sciences, rooted in a tradition of invention and entrepreneurship and dedicated to furthering technology in service to society. In addition to its main location in Brooklyn, NYU Tandon collaborates with other schools within NYU, one of the country’s foremost private research universities, and is closely connected to engineering programs at NYU Abu Dhabi and NYU Shanghai. It operates Future Labs focused on start-up businesses in downtown Manhattan and Brooklyn and an award-winning online graduate program. For more information, visit <http://engineering.nyu.edu>.

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