

# Programming Proteins For Health and Materials



## Gevorg Grigoryan

Assistant Professor, Computer Science

Adjunct Assistant Professor, Biological Sciences

## CURRENT RESEARCH

How the design of novel proteins will create a new generation of scientific exploration

Proteins are molecules that carry out remarkably complex tasks in living cells. Among other things, proteins can be sensors, they can generate mechanical force, and carry out chemical reactions. Remarkably, this breadth of function is encoded in a seemingly simple way -- every protein is a chain of amino-acid building blocks, of which only 20 commonly exist in nature. And the unique sequence of these amino-acid letters determines the specific functions that each protein molecule can carry out. What this means is that proteins are programmable--if we change the amino-acid sequence, we change what the protein does. This is incredible and means that what we have in proteins is an unprecedented capacity to program a remarkably functional class of molecules. The implications of learning to do this well are difficult to overestimate -- from better therapeutics, to novel smart materials, to clean energy solutions.

Dr. Gevorg Grigoryan has devoted his professional career to understanding the complex language of sequencing in order to program molecules. His work is based upon the principle that everything in nature exists because of the encoding of such proteins. Therefore, if he is able to harness the ability to program proteins in order to design novel proteins then, the results will have wide ranging applications -- currently incomprehensible to even imagine. Dr. Grigoryan's highly technical research requires an interdisciplinary team utilizing biology, physics, and computer science. However, despite the rigorous and technical nature of his work, Dr. Grigoryan describes his job as "being creative" saying that his lab is "literally a place where I can have fun and play with ideas."

Specific projects in Dr. Grigoryan's lab fall into three categories:

- **HEALTH:** Dr. Grigoryan and his associates are designing novel proteins to counteract cellular misregulation leading to colon cancer. They have employed novel computational...

## AFFILIATION

Dartmouth College

## EDUCATION

- B.S. in Computer Science 2002 ,University of Maryland Baltimore County
- B.S. in Biochemistry 2002 ,University of Maryland Baltimore County
- Ph.D. in Biology 2007 ,Massachusetts Institute of Technology

## AWARDS

- Alfred P. Sloan Award, 2013
- NRSA Individual Postdoctoral Fellowship, 2009-2011
- NRSA Institutional Postdoctoral Fellowship, 2008-2009
- Chemical Biophysics Symposium 2006 travel award, 2006

## RESEARCH AREAS

- Life Science
- Oncology / Cancer
- Proteomics
- Oncology / Cancer

## FUNDING REQUEST

Your contributions will support the continued work of Dr. Grigoryan and his associates to combine backgrounds in physics, biology, and computer science to fully solve the problems of programming proteins within a lab. As novel proteins are designed, a new generation of advances in health, technology, and science as a whole will begin. Donations will cover the costs of maintaining competitive salaries for leading researchers within the lab and the costs of equipment necessary design novel proteins.

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