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## Makers @ HS/HSL: X-ray Crystallography Research

<b>Maker:</b>	Erik Klontz
<b>Affiliation:</b>	<a href="#">University of Maryland School of Medicine</a>
<b>Project:</b>	3D print a protein model made with PyMol
<b>Used:</b>	<a href="#">PyMol</a> , <a href="#">Lulzbot Taz5</a>

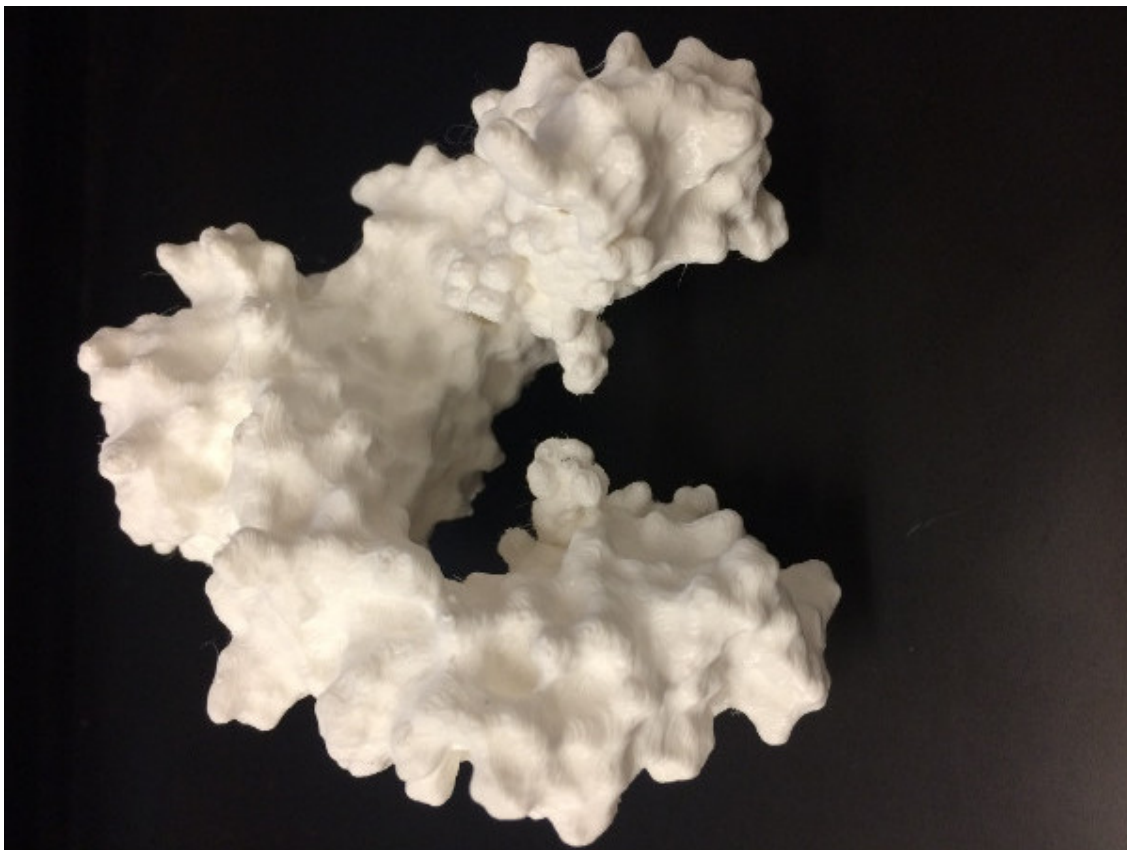
Erik Klontz is a 4th year MD/PhD student in the School of Medicine. He works under [Dr. Eric J. Sundberg, PhD](#), whose lab studies the molecular bases of infectious diseases to develop novel protein therapeutics.

Erik used the HS/HSL Innovation Space to print the three-dimensional crystal structures of two proteins. He created the 3D models of the structures using [PyMOL](#), a molecular visualization program commonly used in x-ray crystallography.

"Being able to hold them in my hands and move them around is very helpful for understanding how these proteins fit together and interact", Erik notes.

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Above: the EndoS2 enzyme print painted by Klontz. The red portion is the glycan (also called a carbohydrate or sugar) from the antibody that EndoS2 recognizes and subsequently removes from the antibody.



An Immunoglobulin G (commonly abbreviated IgG) antibody that EndoS2 interacts with. Eventually

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Erik Klontz, 4th year MD/PhD student, received his BA in chemistry from [Carlton College](#).

As part of his dissertation work, Erik solved the structure of the enzyme endo- $\beta$ -N-acetylglucosaminidase S2, also known as EndoS2, which is produced by the bacteria *Streptococcus pyogenes*.

EndoS2 is unique from other proteins in that its interactions are limited solely to IgG antibodies. This unique property leads researchers to believe that EndoS2 and its mutants could be used to modify antibodies to treat autoimmune disorders and make certain drugs more effective.

"If we can fully understand how this enzyme works, we can make more and different types of therapeutic modifications."

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## Emerging Tech in the News and Literature

1. [Harvard and MIT Researchers Develop Tattoo Ink Capable of Monitoring Health](#) (harvard.edu)
2. [Printed Meds Could Reinvent Pharmacies, Drug Research](#) (umich.edu)
3. [A Practical Guide to Cardiovascular 3D Printing in Clinical Practice: Overview and Examples](#) (nih.gov)

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## Entrepreneur Toolkit

The HS/HSL is pleased to announce the [Entrepreneur Toolkit](#). Developed with input from various UMB contributors, the toolkit will support those interested in learning more

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other related topics.



## Upcoming HS/HSL Innovation Space Workshops

### Introduction to 3D Printing

- November 1, 2017

### Introduction to 3D Modeling

- November 14, 2017

### From CT to .STL: Create a Printable 3D Model from CT Scan Data

- November 16, 2017

[Register for our free workshops](#)

## New to the HS/HSL Innovation Space?

The Innovation Space is designed for innovative and collaborative hands-on learning experiences. It offers three [3D printers](#), two [3D scanners](#), a [Mac Pro](#) with specialized multimedia software, a plotter for [poster printing](#), a [zSpace](#) virtual reality station, [Google Cardboard](#) viewers, a large DNA model, two molecule kits, a button maker, and a 3D printing pen. The staff provides orientations as well as workshops on a regular basis for those who are new to 3D printing and 3D scanning.

For more information, visit our webpage at <http://www.hshsl.umaryland.edu/services/inspace/>.



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