

## SARA MOLINARI, PhD

*Post-doc Research Associate*

Department of Biosciences, Rice University – Houston, (TX)

Caroline Ajo-Franklin's Lab

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## RESEARCH OVERVIEW

After a few training years in cancer cell studies and systems biology, I turned my attention to synthetic biology. During my PhD, I engineered a genetic circuit capable of inducing asymmetric cell division of *E. coli*. In this way, I obtained a microbial strain with the ability to differentiate into genetically distinct cell lineages, similarly to stem cells. This opens the way to the engineering of microbial multicellular systems, as well as to new strategies for pattern formation. Currently I am working on engineering a living hydrogel made of recombinant bacteria producing a protein-based extracellular matrix. This work is part of a broader effort to discover the fundamental principles to create synthetic living materials.

## EDUCATION & EMPLOYMENT

### **Post-Doc Research Associate**

*Rice University*

(2019, Sep - current)

Caroline Ajo-Franklin's Lab, [cajo-franklin@rice.edu](mailto:cajo-franklin@rice.edu)

### **PhD**

*Rice University*

(2014, Aug – 2019, Jul)

Program: Systems Synthetic and Physical Biology (SSPB)

PhD Advisor: Matthew Bennett, [matthew.bennett@rice.edu](mailto:matthew.bennett@rice.edu)

Thesis: A synthetic system for asymmetric cell division in *Escherichia coli*

### **Research Assistant**

*University of Milano-Bicocca*

(2013, Nov - 2014, June)

Cancer cell studies and systems biology.

### **M. Sc. Biotechnology**

*University of Milano-Bicocca*

(2011 – 2013)

Thesis: An ensemble approach for computational studies metabolic rewiring in cancer cells. **Cum Laude.**

### **B. S. Biotechnology**

*University of Perugia*

(2007 – 2011)

Thesis: *Characterization of Di-N-acetyl-chitobiase isoforms.*  
**Cum Laude.**

Internship at University Medical Center Hamburg-Eppendorf

## PAPERS

David M. Zong, Mehdi Sadeghpour, Razan N. Alnahhas, Andrew J. Hirning, **Sara Molinari**, William Ott, Krešimir Josić, and Matthew R. Bennett, "Predictable tuning of gene circuit dynamics in a synthetic microbial consortium", *Molecular Systems Biology*, submitted – in review

**Molinari S**, Shis DL, Bakta S, Chappell J, Igoshin OA & Bennett MR, "A synthetic system for asymmetric cell division in *Escherichia coli*". *Nature Chemical Biology*, volume 15, 917–924 (2019).

Cazzaniga, P., Damiani, C., Besozzi, D., Colombo, R., Nobile, M.S., Gaglio, D., Pescini, D., **Molinari, S.**, Mauri, G., Alberghina, L. and Vanoni, M., 2014. Computational strategies for a system-level understanding of metabolism. *Metabolites*, 4(4), pp.1034-1087.

Damiani, C., Pescini, D., Colombo, R., **Molinari, S.**, Alberghina, L., Vanoni, M. and Mauri, G., 2014. An ensemble evolutionary constraint-based approach to understand the emergence of metabolic phenotypes. *Natural computing*, 13(3), pp.321-331.

Damiani, C., Colombo, R., **Molinari, S.**, Pescini, D., Gaglio, D., Vanoni, M., Alberghina, L. and Mauri, G., 2013. An ensemble approach to the study of the emergence of metabolic and proliferative disorders via Flux Balance Analysis. *arXiv preprint arXiv:1309.7696*.

## **AWARDS & SCHOLARSHIPS**

**90 second thesis competition** (Mar 3, 2017) - Rice University  
**Erasmus Placement Scholarship** (2010) - University Medical Center Hamburg-Eppendorf  
**AFS – Annual Exchange Program** (2005-2006) - Scholarship to spend a full school year in Germany

## **TALKS & POSTERS**

**Living Materials 2020**      accepted oral presentation. (Feb 12<sup>th</sup> -14<sup>th</sup>, 2020)  
**SEED 2019**                90 second oral poster presentation. (Jun 22<sup>nd</sup> -26<sup>th</sup>, 2019)  
**SEED 2017**                90 second oral poster presentation. (Jun 20<sup>th</sup> -23<sup>rd</sup>, 2017)  
**SYSBIO**                    Oral presentation (Oct 22<sup>nd</sup>, 2013)

DARPA ELM PI meeting – Poster (May 23<sup>rd</sup> -24<sup>th</sup>, 2018)  
DARPA ELM PI meeting – Poster (Nov 15<sup>th</sup> -16<sup>th</sup>, 2017)  
DARPA BRICS PI meeting – Poster (Nov 15<sup>th</sup> -16<sup>th</sup>, 2017)  
DARPA BRICS PI meeting – Poster (Nov 15<sup>th</sup> -16<sup>th</sup>, 2017)

## **OTHER CONFERENCES: ATTENDANCE**

M-CELS Workshop 2018  
International Synthetic and Systems Biology Summer School - Taormina, Italy (2015)  
24th Keck Annual Research Conference (2014)  
Wivace 2013 - Italian Workshop on Artificial Life and Evolutionary Computation (2014)  
SYSBIO kick-off meeting - Milan, Italy. (2013)  
17th Workshop of the European Study Group on Lysosomal Diseases Bad Honnef, Germany. (2009)

## **SKILLS:**

**Fluorescence microscopy & microfluidics.** I also optimized the agar pad fluorescence microscopy protocol I used in my most recent research.  
**qPCR:** on bacterial plasmids and colony qPCR  
**Flow cytometry**  
**Cloning:** modern techniques including Golden Gate and Gibson.  
**Software:** MATLAB, ImageJ/Fiji, Vector graphics, LaTeX.

**LANGUAGES:** **Italian** (native speaker), **English** (fluent), **Spanish** (proficient), **German** (conversational).  
**Language Certificates:** TOEFL (2013); Zertifikat Deutsch (2006); PET (2005).