



**MARIE SKŁODOWSKA-CURIE INDIVIDUAL FELLOWSHIPS 2018**  
**EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS**

### HOST INSTITUTION

Instituto de Tecnologia Química e Biológica António Xavier (ITQB-NOVA) | MOSTMICRO Research Unit

### RESEARCH GROUP AND URL

Single Molecule Microbiology Lab  
<http://www.itqb.unl.pt/research/biology/single-molecule-microbiology/zach-hensel-lab>

### SUPERVISOR (NAME AND E-MAIL)

Zach Hensel  
[zach.hensel@itqb.unl.pt](mailto:zach.hensel@itqb.unl.pt)

### SHORT CV OF THE SUPERVISOR

Zach Hensel started the Single Molecule Microbiology lab at ITQB NOVA in January 2017. He obtained his PhD in Molecular Biophysics, focusing on single-molecule studies of gene regulation in bacteriophage lambda lysogeny. His postdoctoral work focused on characterizing unexpected oscillations in gene expression for a negatively auto regulated gene, and investigating possible molecular mechanisms underlying these oscillations using single-molecule fluorescence microscopy and stochastic chemical simulations.

### 5 SELECTED PUBLICATIONS

- Z Hensel, A plasmid-based Escherichia coli gene expression system with cell-to-cell variation below the extrinsic noise limit, PLoS one 12 (10), e0187259.
- Z Hensel, TT Marquez-Lago, Cell-cycle-synchronized, oscillatory expression of a negatively autoregulated gene in E. coli, arXiv preprint arXiv:1506.08596.
- Z Hensel, X Weng, AC Lagda, J Xiao, Transcription-factor-mediated DNA looping probed by high-resolution, single-molecule imaging in live E. coli cells, PLoS biology 11 (6), e1001591.
- Z Hensel, J Xiao, Single-molecule methods for studying gene regulation in vivo, Pflügers Archiv-European Journal of Physiology 465 (3), 383-395.
- Z Hensel, H Feng, B Han, C Hatem, J Wang, J Xiao, Stochastic expression dynamics of a transcription factor revealed by single-molecule noise analysis, Nature Structural and Molecular Biology 19 (8), 797.

<https://scholar.google.pt/citations?user=QwsENLQAAAAJ&hl=en>



UNIVERSIDADE  
**NOVA**  
DE LISBOA

## PROJECT TITLE AND DESCRIPTION

### ***Single-cell and single-molecule studies of heterogeneity in gene expression in symbiotic and pathogenic biofilms***

How does gene expression vary in biofilms exposed to chemical gradients? This question is relevant to the establishment and evolution of symbiotic and pathogenic microbial communities. Our lab is looking for a research fellow who will help establish new single-cell, fluorescence microscopy techniques (often with single-molecule resolution) for investigating this question. Depending upon the expertise and research interests of the fellow, work can focus on creating biological tools (fluorescent reporters of transcription, single-molecule reporters for studying transcription factor dynamics, microfluidics cell culture and manipulation), implementing new 3D microscopy methods for imaging thick samples (e.g. multi focus microscopy or PSF engineering with adaptive optics), developing an image processing and data analysis pipeline, or some combination of these.

## SCIENTIFIC AREA WHERE THE PROJECT FITS BEST

Life Sciences (LIF)