

## Dr. Alvaro R. Lara

Associate Professor

Department of Processes and Technology

Universidad Autónoma Metropolitana-Cuajimalpa

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### RESEARCH INTERESTS

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Biochemical Engineering, Biological Engineering, Synthetic Biology, Biomanufacturing

### EDUCATION

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**Universidad Nacional Autónoma de México (UNAM), Mexico**

2003-2007

Institute of Biotechnology, Degree: Ph.D. (with Honours Mention)

Advisor: Octavio T. Ramírez

PhD Thesis: *"Bioreactor scale-down and cell engineering for improving recombinant protein production in Escherichia coli"*

**Instituto Politécnico Nacional (IPN), Mexico**

1996-2001

Department of Biochemical Engineering. Degrees: B.S. (with Honours Mention)

### APPOINTMENTS

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**Associate Professor of Biological Engineering**

2011-present

Department of Processes and Technology, Universidad Autónoma Metropolitana (UAM)

**Associate Professor (Tenure track)**

2008-2011

Department of Processes and Technology, Universidad Autónoma Metropolitana (UAM)

**Process Chemist**

2001-2003

Kraft Foods of Mexico

### AWARDS AND HONORS

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**Awards and Honors (not exhaustive)**

Bill and Melinda Gates Foundation fellowship to attend the Microbial Engineering Conference (ECI) 2018

Carlos Casas Campillo Award, Mexican Society for Biotechnology and Bioengineering. 2014

European Science Foundation Fellowship to attend the Conference on Microbes and Industrial 2010

Biotechnology and the School on Advanced Techniques in Bacterial Genome Research in Bielefeld, DE

Fellowship of the German Academic Service to perform research at RWTH-Aachen 2007

Fellowship of the Huygens Programme of NUFFIC to perform a research stay at TU-Delft 2005

## RESEARCH VISITS

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Visiting Researcher, Institute of Biochemical Engineering, RWTH-Aachen, Germany	2016
Centre for Biotechnology, Bielefeld University, Germany	2012
Visiting Researcher, Department of Biotechnology, Delft University of Technology	2005

## STUDENT AWARDS AND HONORS

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Karim E. Jaén, Alfredo Sánchez Marroquín Award for Doctoral Thesis, Mexican Society for Biotechnology	2019
Daniela Velazquez, Sergio Sánchez Esquivel Award for MSc Thesis protocol, Mexican Society for Biotechnology and Bioengineering	2019
Karim E. Jaén, University Merit Medal for PhD Thesis, Metropolitan University	2018
Angélica Reyes, University Merit Medal for MSc Thesis, Metropolitan University	2018
Janet Galindo, University Merit Medal for Diploma Thesis, Metropolitan University	2017
Karim E. Jaén, British Council Newton Fund fellowship to attend "Scale Up of Bioreactor for the Production of Pharmaceuticals and Food: Towards Quality-By-Design"	2016
Mariana Juárez, European Society for Animal Cell Technology award to attend the 1er ESACT Frontiers Retreat in Lyon, France	2016
Elisa Ramírez, 1 <sup>st</sup> place in the BSc Symposium of the Metropolitan University	2015
Mariana Juárez, European Society for Animal Cell Technology award to attend the course on Animal cell Technology in Girona, Spain	2014
Gheorghe M. Borja, Alfredo Sánchez Marroquín Award for MSc Thesis, Mexican Society for Biotechnology	2013

## EDITORIAL BOARDS

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<i>Microbial Cell Factories</i> (Impact Factor: 4.187),	2017-present
<i>Bioprocess and Biosystems Engineering</i> (Impact Factor: 2.419),	2018-present
<i>Microorganisms</i> (Impact Factor: 4.152)	2019-present
<i>Engineering in Life Sciences</i> (Impact Factor: 1.934)	2019-present

## PUBLICATIONS

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Independent citations (IC) as of 01/07/2020: 752      H index (Scopus): 16      \* = Corresponding author

**A) Research Articles.** IF: Journal's Impact Factor. Ratio of articles as first or corresponding author: 27/42 = 0.64.

**49)** De la Cruz M, Ramírez EA, Sigala JA, Utrilla J, **Lara AR\***. Effect of proteome reduction on plasmid DNA production in *E. coli*. In preparation.

**48)** Velazquez D, Jaén KE, Sigala JC, **Lara AR\***. Minimized backbone and novel microaerobic promoters boost plasmid DNA production in engineered *E. coli*. In preparation.

**47)** Ramírez EA, Sigala JA, **Lara AR\***. Evaluation of plasmid DNA production in genome-reduced *E. coli*. In preparation.

- 46) Juárez M, González-De la Rosa CH, Sigala JC, **Lara AR\***. Effect of *Vitreoscilla* hemoglobin on recombinant protein expression and energy metabolism of CHO cells. Submitted.
- 45) Arteaga JE, Cerros K, Rivera-Becerril E, **Lara AR**, Le Borgne S, Sigala JC. Furfural bio-transformation in *Acinetobacter baylyi* ADP1 and *Acinetobacter schindleri* ACE. Submitted.
- 44) Jaén KE, Velázquez D, Sigala JC, **Lara AR\***. Enhancing microaerobic plasmid DNA production by chromosomal expression of *Vitreoscilla* hemoglobin in *E. coli*. Submitted.
- 43) **Lara AR\***, Galindo J, Jaén KE, Juárez M, Sigala JC. Physiological responses of *Escherichia coli* W3110 and BL21 to the aerobic expression of *Vitreoscilla* hemoglobin. Submitted to Journal of Microbiology and Biotechnology.
- 42) Grijalva-Hernández F, Vega-Estrada J, Escobar-Rosales M, Ortega-López J, Aguilar-López R, **Lara AR**, Montes-Horcasitas MC. 2019. High kanamycin concentration as another stress factor additional to temperature to increase pDNA production in *E. coli* DH5 $\alpha$  batch and fed-batch cultures. Microorganisms (MDPI). 7: 711. IF: 4.152 IC: 1
- 41) Sigala Alanis JC, Quiroz L, Arteaga E, Olivares R, Lara AR, Martínez A. 2019. Physiological and transcriptional comparison of acetate catabolism between *Acinetobacter schindleri* ACE and *Escherichia coli* JM101. FEMS Microbiology Letters. 366(12): fnz151. IF: 1.994.
- 40) Jaén KE, Velázquez D, Sigala JC, **Lara AR\***. 2019. Design of a microaerobically inducible replicon for high-yield plasmid DNA production. Biotechnology and Bioengineering. 116(10): 2514-2525. IF: 4.260. IC: 1
- 39) Jaén KE, Velázquez D, Delvigne F, Sigala JC, **Lara AR\***. 2019. Engineering *E. coli* for improved microaerobic pDNA production. Bioprocess and Biosystems Engineering. 42(9): 1457-1466. IF: 2.371 IC: 1
- 38) **Lara AR\***, Velázquez D, Penella, Islas F, González-De la Rosa CH, Sigala JC. 2019. Design of a synthetic miniR1 plasmid and its production by engineered *Escherichia coli*. Bioprocess and Biosystems Engineering. 42(8): 1391-1397. IF: 2.371 IC: 1
- 37) **Lara AR\***, Jaén KE, Folarin O, Keshavarz-Moore E, Büchs J. 2019. Effect of the oxygen transfer rate on oxygen-limited production of plasmid DNA by *Escherichia coli*. Biochemical Engineering Journal. 150: 107303. IF: 3.371 IC: 1
- 36) Martínez JA, Rodríguez A, Moreno F, Flores N, **Lara AR**, Ramírez OT, Gosset G, Bolívar F. 2018. Metabolic modeling and response surface analysis for an engineered *Escherichia coli* for shikimic acid production. BMC Systems Biology. 12:102. IF: 2.048.
- 35) **Lara AR\***, Jaén KE, Sigala JC, Regestein L, Büchs J. 2017. Evaluation of microbial globin promoters for oxygen-limited processes using *Escherichia coli*. Journal of Biological Engineering. 11: 39. IF: 5.256 IC: 1
- 34) Sigala JC, Suárez BP, **Lara AR**, Le Borgne S, Bustos P, Santamaría RI, González V, Martínez A. 2017. Genomic and physiological characterization of a laboratory-isolated *Acinetobacter schindleri* ACE strain that quickly and efficiently catabolizes acetate. Microbiology (United Kingdom). 163: 1052-1064. IF: 2.151. IC: 2

- 33) Jaén KE, Olivares R, Sigala JC, **Lara AR\***. 2017. Heterogeneous oxygen availability affects the titer and topology but not the fidelity of plasmid DNA produced by *Escherichia coli*. *BMC Biotechnology*. 17:60. *IF*: 2.605. *IC*: 4
- 32) Juárez M, González-De la Rosa CH, Memún E, Sigala JC, **Lara AR\***. 2017. Aerobic expression of *Vitreoscilla* hemoglobin improves the growth performance of CHO-K1 cells. *Biotechnology Journal*. 12(3): 1600438. *IF*: 3.507. *IC*: 1
- 31) **Lara AR\***, Jaén KE, Mühlmann M, Sigala JC, Regestein L, Büchs J. 2017. Characterization of endogenous and reduced promoters for oxygen-limited processes using *Escherichia coli*. *ACS Synthetic Biology*. 6: 344-356. *IF*: 5.382. *IC*: 6
- 30) Baert J, Delepierre A, Telek S, Tøye D, Delamotte A, **Lara AR**, Jaén KE, Gosset G, Jensen P, Delvigne, F. 2016. Microbial population heterogeneity versus bioreactor heterogeneity: evaluation of Redox Sensor Green as an exogenous metabolic biosensor. *Engineering in Life Sciences*. 16(7): 643-651. *IF*: 1.698. *IC*: 4
- 29) Pablos TE, Olivares R, Sigala JC, Ramírez OT, **Lara AR\***. 2016. Toward efficient microaerobic processes using engineered *Escherichia coli* W3110 strains. *Engineering in Life Sciences*. 16(7): 588-597. *IF*: 1.698. *IC*: 2
- 28) Galindo JE, Barrón BL, **Lara AR\***. 2016. Plasmid DNA production in shake flasks is improved by enzyme-controlled glucose release. *Annals of Microbiology*. 66(3): 1337-1342. *IF*: 1.122.
- 27) Ramírez EA, Velázquez D, **Lara AR\***. 2016. Enhancing plasmid DNA production in shake flask by enzyme-mediated glucose release and engineered *E. coli*. *Biotechnology Letters*. 38(4): 651-657. *IF*: 1.730. *IC*: 4
- 26) Cortés T, Flores N, Bolívar F, **Lara AR**, Ramírez OT. 2016. Physiological effects of pH gradients on *Escherichia coli* during plasmid DNA production. *Biotechnology and Bioengineering*. 113(3): 598-611. *IF*: 4.481. *IC*: 5
- 25) Freudenau I, Lutter P, Bayer R, Schleef M, Bednarz H, **Lara AR**, Niehaus K. 2015. ColE1-plasmid production in *Escherichia coli*: Mathematical Simulation and Experimental Validation. *Frontiers in Bioengineering and Biotechnology*. 3: 127. *IF*: 5.122. *IC*: 3
- 24) Delvigne F, **Lara AR**, Al-Soud W, Sorensen SJ. 2014. Metabolic variability in bioprocessing: implications of microbial phenotypic heterogeneity. *Trends in Biotechnology*. 32(12): 608-616. *IF*: 11.427. *IC*: 42
- 23) Beltrán NE, Reyes A, **Lara AR**. 2014. Cardiac tissue engineering as an alternative to current therapies: economical and technical challenges. *Experimental and Clinical Cardiology*. 20 (8): 3375-3388. *IF*: 0.758
- 22) Gálvez R, Pablos TE, Sigala JC, **Lara AR\***. 2014. Co-utilization of glucose and xylose increases plasmid DNA production by engineered *Escherichia coli*. *Revista Mexicana de Ingeniería Química*. 13(2): 387-391. *IF*: 0.569 *IC*: 2
- 21) Pablos TE, Sigala JC, Le Borgne S, **Lara AR\***. 2014. Aerobic expression of *Vitreoscilla* hemoglobin efficiently reduces overflow metabolism in *Escherichia coli*. *Biotechnology Journal*. 9(6): 791-799. *IF*: 3.490 *IC*: 11
- 20) Licona-Cassani C, Lara AR, Cabrera-Valladares N, Hernández-Chávez G, Escalante A, Martínez A, Bolívar F,

- Gosset G. 2014. Inactivation of pyruvate kinase or the phosphoenolpyruvate:sugar phosphotransferase system increases shikimic and dehydroshikimic acid yields from glucose in *Bacillus subtilis* engineered strains. *Journal of Molecular Microbiology and Biotechnology*. 24: 37-45. *IF: 2.104 IC: 18*
- 19) Wunderlich M, Taymaz-Nikerel H, Gosset G, Ramírez OT, **Lara AR\***. 2014. Effect of growth rate on plasmid DNA production and metabolic performance of engineered *Escherichia coli* strains. *Journal of Bioscience and Bioengineering*. 17(3): 336-342. *IF: 1.884. IC: 9*
- 18) Jaén KE, **Lara AR\***, Ramírez OT. 2013. Effects of heating rate on pDNA production by *E. coli*. *Biochemical Engineering Journal*. 79: 230-238. *IF: 2.368 IC: 3*
- 17) Caspeta L, **Lara AR**, Pérez NO, Flores N, Bolívar F, Ramírez OT. 2013. Enhancing thermo-induced recombinant protein production in *Escherichia coli* by temperature oscillations and post-induction nutrient feeding strategies. *Journal of Biotechnology*. 167: 43-55. *IF: 2.884 IC: 7*
- 16) Fuentes LG, **Lara AR**, Martínez LM, Ramírez OT, Martínez A, Bolívar F, Gosset G. 2013. Modification of glucose import capacity in *Escherichia coli*: physiologic consequences and application to improve DNA vaccine production. *Microbial Cell Factories*. 12:42. *IF: 4.250 IC: 14*
- 15) Borja MG, Meza E, Gosset G, Ramírez OT, **Lara AR\***. 2012. Engineering *E. coli* to increase plasmid DNA production in high cell-density cultivations in batch mode. *Microbial Cell Factories*. 11: 132. *IF: 3.310. IC: 18*
- 14) Pablos TE, Soto R, Meza E, Le Borgne S, Gosset G, Ramírez OT, **Lara AR\***. 2012. Enhanced production of plasmid DNA by engineered *Escherichia coli* strains. *Journal of Biotechnology*. 158: 211-214. *IF: 3.045. IC: 5*
- 13) Soto R, Caspeta L, Barrón BL, Gosset G, Ramírez OT, **Lara AR\***. 2011. High cell-density cultivation in batch mode for plasmid DNA vaccine production by a metabolically engineered *E. coli* strain with minimized overflow metabolism. *Biochemical Engineering Journal*. 56(3): 165-171. *IF: 2.645. IC: 6*
- 12) **Lara AR\***, Knabben I, Caspeta L, Sassi J, Ramírez OT, Büchs J. 2011. Comparison of oxygen enriched air vs pressurized cultivations to increase oxygen transfer and to scale-up plasmid DNA production fermentations. *Engineering in Life Sciences*. 11(4): 382-386. *IF: 1.925. IC: 12*
- 11) Pablos TE, Meza E, Le Borgne S, Gosset G, Ramírez OT, **Lara AR\***. 2011. *Vitreoscilla* hemoglobin expression in engineered *Escherichia coli*: Improved performance in high cell-density batch cultivations. *Biotechnology Journal*. 6(8): 993-1002. *IF: 3.446. IC: 12*
- 10) **Lara AR\***. 2011. Recombinant protein production in *Escherichia coli*. *Revista Mexicana de Ingeniería Química*. 10(2): 209-223. *IF: 0.578. IC: 10*
- 9) Knabben I, Regestein L, Marquering F, Steinbusch S, **Lara AR**, Büchs J. 2010. High cell-density processes in batch mode of a genetically engineered *Escherichia coli* strain with minimized overflow metabolism using a pressurized bioreactor. *Journal of Biotechnology*. 150: 73-79. *IF: 2.970. IC: 24*
- 8) **Lara AR\***, Taymaz-Nikerel H, van Gulik W, Heijnen JJ, Ramírez OT, van Winden W. 2009. Fast dynamic response of *Escherichia coli* fermentation metabolism to aerobic and anaerobic glucose pulses. *Biotechnology and Bioengineering*. 104: 1153-1161. *IF: 3.377. IC: 38*

- 7) Chávez-Béjar MI, Lara AR, López H, Hernández-Chávez G, Martínez A, Ramírez OT, Bolívar F, Gosset G. 2008. Metabolic engineering of *Escherichia coli* for L-tyrosine production by the expression of the genes coding for the chorismate mutase domain from native P-protein and a cyclohexadienyl dehydrogenase from *Zymomonas mobilis*. *Applied and Environmental Microbiology*. 74: 3284-3290. *IF*: 3.801. *IC*: 25
  
- 6) Lara AR, Caspeta L, Gosset G, Bolívar F, Ramírez OT. 2008. Utility of an *Escherichia coli* strain engineered in the substrate uptake system for improved culture performance at high glucose and cell concentrations: an alternative to fed-batch cultures. *Biotechnology and Bioengineering*. 99: 893-901. *IF*: 2.936. *IC*: 37
  
- 5) Lara AR, Galindo E, Ramírez OT, Palomares AL. 2006. Living with heterogeneous bioreactors: Understanding the effect of environmental gradients on cells. *Molecular Biotechnology*. 34: 355-381. *IF*: 1.671. *IC*: 197
  
- 4) Lara AR, Vázquez-Limón C, Gosset G, Bolívar F, López-Munguía A, Ramírez OT. 2006. Engineering *Escherichia coli* to improve culture performance and reduce by-product formation during recombinant protein production under transient intermittent anaerobic conditions. *Biotechnology and Bioengineering*. 94: 1164-1175. *IF*: 3.037. *IC*: 31
  
- 3) De Anda R, Lara AR, Hernández V, Hernández-Montalvo V, Gosset G, Bolívar F, Ramírez OT. 2006. Replacement of the glucose phosphotransferase transport system by galactose permease reduces acetate accumulation and improves process performance of *Escherichia coli* for recombinant protein production without impairment of growth rate. *Metabolic Engineering*. 8: 281-290. *IF*: 3.444. *IC*: 84
  
- 2) Lara AR, Leal LI, Flores N, Gosset G, Bolívar F, Ramírez OT. 2006. Transcriptional and metabolic response of recombinant *Escherichia coli* to spatial dissolved oxygen tension gradients simulated in a scale-down system. *Biotechnology and Bioengineering*. 93: 373-385. *IF*: 3.037. *IC*: 61
  
- 1) De Jesús A, Lara-Rodríguez A, Santoyo-Tepole F, Juárez-Ramírez C, Cristiani-Urbina E, Ruiz-Ordaz N, Galíndez-Mayer J. 2003. Biodegradation of the water-soluble gasoline components in a novel hybrid bioreactor. *Engineering in Life Sciences*. 3 (7): 306-312. *IF*: 0.969. *IC*: 5

**B) Book chapters by invitation** \* = Corresponding author      Ratio as first or corresponding author: 3/5 = 60 %

- 5) Lara AR, Palomares LA, Ramírez OT. 2017. Scale-down: Simulating large-scale cultures in the laboratory. In: *Industrial Biotechnology*. Vol. 4, pp- 55-79. C Wittmann and J Liao (eds). Wiley Biotechnology Series. *IC*: 3
  
- 4) Mairhofer J, Lara AR\*. 2014. Advances in strains and vector development for plasmid DNA vaccines production. In: *Cancer Vaccines-Methods and Protocols*. *Methods in Molecular Biology*. Vol. 1139. Pp. 505-542. MJP Lawman and PD Lawman (eds). Springer/Humana Press. *IC*: 11
  
- 3) Lara AR\*, Ramírez OT. 2012. Plasmid DNA production for therapeutic applications. In: *Recombinant Gene Expression*. *Methods in Molecular Biology* 3rd ed. Vol. 824, part 2, pp. 271-303. A. Lorence (ed). Springer/Humana Press. *IC*: 18
  
- 2) Palomares LA, Lara AR, Ramírez OT. Bioreactor Scale-Down. 2010. In: *Encyclopedia of Industrial Biotechnology: Bioprocess, bioseparation and cell technology*. MC Flickinger (ed). John Wiley and Sons. NY, USA. *IC*: 3

- 1) Ruíz-Ordaz N, Juárez-Ramírez C, Castañón-González H, **Lara-Rodríguez A**, Cristiani-Urbina E, Galíndez-Mayer J. 2000. Aerobic bioprocesses and bioreactors used for phenol degradation by free and immobilised yeast cells. In: Recent Research Developments in Biotechnology & Bioengineering. SG Pandalai (ed). Research Signpost. Trivandaram, India. 3: 83-94. IC: 5

### C) Editorial Notes

- 1) Taymaz-Nikerel H, Lara AR\*. 2016. Quantitative Systems Biology for Engineering Organisms and Pathways. Front Bioeng Biotechnol. 4:22. doi: 10.3389/fbioe.2016.00022. IF: 5.122 IC: 2
- 2) Oliveira PH, Mairhofer J, Alves PM, **Lara AR**, Kontoravdi C. 2015. Advances in the development of biotherapeutics. BioMed Research International. Vol 2015. Article ID 793876. FI: 1.579 IC: 1

**E) Patents** \*Main inventor      **Ratio as first or main inventor:** 4/4 = 100 %

- 4) **Lara AR\***, Islas-Lugo F, Sigala JC. Mini plásmido sintético con rendimientos superiores bajo condiciones microaerobias. MX/a/2020/003258.
- 3) Jaén KED, Velázquez DL, Sigala JC, **Lara AR\***. 2017. Plásmidos inducibles por condiciones microaerobias y su uso. Submitted. MX/E/2017/036457.
- 2) **Lara AR\***, Borja GMM, Gosset G, Ramírez OT. 2016. Cepa de *Escherichia coli* con mutaciones para la alta producción de ácidos nucleicos recombinantes y su uso en cultivos de alta densidad celular en modo lote. México. Patent Number 342245.
- 1) **Lara AR**, Vázquez-Limón C, Gosset G, Bolívar F, López-Munguía A, Ramírez OT. 2014. Estrategia para generar células insensibles a condiciones heterogéneas en biorreactores a través de mutaciones de vías metabólicas anaerobias. México. Patent Number 324994.

### F) Books Editor

Title: Minimal Cells: Design, Construction, Biotechnological Applications.

Edited by: Guillermo Gosset and Alvaro R. Lara.

Editorial: Springer. 2020. ISBN-10: 3030318966.

## INTERNATIONAL INVITED PRESENTATIONS AND LECTURES

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2016. Towards efficient microaerobic processes using engineered *Escherichia coli* strains.  
4<sup>th</sup> BioProScale Symposium, Berlin, Germany.
2014. Plasmid DNA production by *E. coli*: Cell engineering, cultivation techniques and process monitoring.  
3rd BioproScale Symposium. Berlin, Germany.
2012. Bioprocess intensification through high cell-density cultivation in batch mode of metabolically engineered

*E. coli* strains.  
Biotechnology Summit 2012. Mérida, México.

Metabolic engineering to increase the production of plasmid DNA vaccines by *Escherichia coli*.  
Biotechnology Summit 2012. Mérida, México.

**2010.** New strains and cultivation methods for pDNA production by *Escherichia coli*.  
Microbes and Industrial Biotechnology. Bielefeld, Germany.

## FUNDING

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> 480,000 Euros in different projects

Note: Project budgets in Mexico do not include the payment of salaries for PhD researchers.

**2019-2021** Design of dynamic control schemes to improve recombinant protein production in *Escherichia coli*.  
Co-PI (together with Prof. Guillermo Gosset, UNAM)  
Budget: ca. 138,000 EUR  
Sponsor: CONACyT

**2016-2020** Microaerobic production of recombinant protein in *Escherichia coli*.  
Budget: ca. 60,000 EUR  
Sponsor: CONACyT

**2016-2019** Diseño y desarrollo de vectores sintéticos inducibles para la producción de vacunas de ADN  
Budget: ca. 43,000 EUR  
Sponsor: CIBIOGEM-CONACyT

**2015-2017** Integration of biological technologies to develop an efficient and scalable plasmid DNA production platform  
Budget: ca. 25,000 EUR  
Sponsor: CONACyT

**2014-2017** Mexico-Belgium Collaborative Project: Genetic engineering of *E. coli* for improving bioprocess robustness.  
(Co-PI: Prof. Frank Delvigne, Liege University).  
Budget: ca. 12,000 EUR  
Sponsor: CONACyT-FNRS

**2013-2015** Effects of *Vitreoscilla* hemoglobin expression on the aerobic and microaerobic metabolism of *E. coli*  
Budget: ca. 40,000 EUR  
Sponsor: CONACyT

**2012-2014** Mexico-Germany Project: Metabolic flux analysis and metabolic modelling of *Escherichia coli* strains during plasmid DNA production.  
(Co-PI: Prof. Karsten Niehaus, Bielefeld University).  
Budget: ca. 21,000 EUR  
Sponsors: Bundesministerium für Bildung und Forschung (BMBF) and CONACyT.

**2012-2013** Characterization of microbial cell factories by RT-qPCR  
Budget: ca. 20,000 EUR  
Sponsor: Secretary of Public Education



**2010** Equipment Grant for Higher Education Institutions  
Budget: 22,000 EUR  
Sponsor: German Academic Exchange Service (DAAD)

**2009-2011** Cell and culture engineering to intensify DNA vaccine production processes  
Budget: ca. 72,000 EUR  
Sponsor: CONACyT

**2008-2010** Metabolic engineering of *Escherichia coli* to improve DNA vaccines production  
Budget: ca. 30,000 EUR  
Sponsor: Secretary of Public Education

## TEACHING EXPERIENCE

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### **Courses Taught at the Metropolitan University**

UG: undergraduate course; PG: postgraduate course; S, A, W: Spring, Autumn or Winter term, respectively.

Course	Level	Term
1) Introduction to mathematical thinking	UG	08A, 18A
2) Sustainable development	UG	09A
3) Math Workshop	UG	10W, 14A
4) Biochemistry I	UG	10A, 11A, 12A, 14W
5) Biological Systems	UG	10S, 19W
6) Biochemistry II	UG	11W, 11S, 12W, 16W, 17W, 18W
7) Bioreactor Engineering I	UG	12W, 13S, 14S, 15S, 17S, 18S, 19S
8) Bioreactor Engineering II	UG	19A
9) BSc Project I	UG	12W, 13W, 14W, 15W, 17W, 18W, 18S, 19W, 19S, 19A
10) BSc Project II	UG	12S, 13S, 14S, 15S, 17S, 18W, 18S, 19S, 19W, 20S
11) Fermentation Technology	UG	12W
12) Pharmaceutical Bioprocesses	UG	12W, 12S, 14S
13) Cellular engineering	UG	12A, 13W, 18S
14) Cell culture engineering	UG	12A, 13S
15) Industrial Microbiology	UG	14A
16) Physical Chemistry	UG	14W
17) Introduction to Biological Engineering	UG	15W, 17A, 18A
18) Mass Balances	UG	15A, 16W
19) Biological Reactors	PG	14W, 15S, 19W
20) Microbial Physiology	PG	14S
21) Biokinetics	PG	09W

## RESEARCHERS SUPERVISED

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### A) Postdoctoral Researchers

Dr. Fabiola Islas Lugo (2018-2020).

Synthetic biology and fermentation technology to increase the production of a novel miniR1 plasmid.

### B) Theses Supervised

#### B.1 In progress

Daniela Velázquez Gallegos (2018-to date)

MSc in Biological Engineering

Cell Engineering as an alternative to fed-batch cultures for the production of recombinant proteins in *Escherichia coli*

Elisa Alejandra Ramírez Campos (2018-to date)

MSc in Biological Engineering

Biotechnological potential of genome and proteome reduced cells as factories for biopharmaceuticals production

#### B.2 Finished Theses

##### B.2.1 Doctoral Theses

2. Mariana Juárez Osorio.

PhD in Biological Engineering, UAM

Evaluation of the transient expression of *Vitreoscilla* hemoglobin on the energy metabolism of CHO cells.

Finished: May, 2019

1. Karim Enrique Jaén Chávez

PhD in Biological Engineering, UAM

Development of an efficient platform plasmid DNA production under microaerobic conditions.

Finished: April, 2019

##### B.2.2 Masters Theses

6. Janet Galindo Martínez

MSc in Biological Engineering, UAM

Effect of *Vitreoscilla* hemoglobin on the aerobic metabolism of two industrially-relevant *E. coli* strains.

Finished: November, 2019

5. Angélica Reyes Lastiri

MSc in Biological Engineering, UAM

Characterization and validation of a perfusion bioreactor for cardiac cells culture

Finished: October, 2017

4. Karim Enrique Jaén Chávez

MSc in Chemical Engineering, National Autonomous University of Mexico

Effect of the heating rate on the production of plasmid DNA in *Escherichia coli*

Finished: June, 2013

3. Tania Elena Pablos Rojo  
MSc in Biotechnology, UAM  
Expression of a heterologous hemoglobin in *Escherichia coli* PTS<sup>-</sup> GalP<sup>+</sup>  
Finished: December, 2011.

2. Gheorghe Manuel Borja Samfir  
MSc in Biochemical Sciences, National Autonomous University of Mexico  
Cell engineering to increase plasmid DNA production in *Escherichia coli*.  
Finished: November, 2011.

1. Martin Wunderlich  
MSc in Bioprocess Engineering, Technische Universität Dresden, Germany  
Kinetic characterization of *E. coli* mutant strains during plasmid DNA production in chemostats  
Finished: July, 2010

### C) Bachelor Theses

10. Axel Vilchis  
Microaerobic production of recombinant protein in *Escherichia coli*  
Finished: July, 2020

9. Mitzi de la Cruz  
Plasmid DNA production in a proteome-reduced *Escherichia coli* strain.  
Finished: March, 2020

8. Daniela Velazquez Gallegos  
Evaluation of synthetic circuits to increase microaerobic plasmid DNA production  
Finished: July, 2018.

7. Desing of a synthetic miniR1 plasmid and its production in engineered *Escherichia coli*  
Finished: July, 2018.

6. Mitsuo Nakakawa and Victoria Hinojosa  
Process for the production of recombinant chimosin.  
Finished: July, 2017.

5. Elisa Alejandra Ramírez  
Production of plasmid DNA in high cell-density cultures in shake flasks.  
Finished: July, 2015

4. Abner Jair Gonzalez  
Reduction of the vector size for improving plasmid DNA vaccines production.  
Finished: July, 2014

3. Janet Galindo  
Experimental evaluation and theoretical scale-up of high cell-density cultures of an engineered *E. coli* strain.  
Finished: July, 2013.

2. Angélica Reyes Lastiri  
Viability and factibility of cardiac cells biorreactor culture.  
Finished: July, 2013

1. Renata Gálvez  
Use of mixed carbon sources to increase plasmid DNA vaccines production in engineered *E. coli* strains.

Finished: July, 2012

## PROFESSIONAL SERVICE

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Secretary of the Mexican Society for Biotechnology and Bioengineering (2020-2022).

Deputy Secretary of the Mexican Society for Biotechnology and Bioengineering (2018-2020).

### Member of special Editorial Boards

Guest Editor for the special issue of *Frontiers in Bioengineering and Biotechnology: Systems Biology of pathways and organisms*. May, 2016. ISBN: 978-2-88919-829-0.

Guest Editor for the special issue of *Biomed Research International: Advances in Biotherapeutics Development*, 2015.

### Research projects with industry

2012-2013. Identification and valorization of opportunities for technological products from avocado seeds using a synthetic metabolic pathway and biological components. Company: SIOSI Alimentos.

2010. Optimization of a process for the production of a veterinary vaccine. Company: Avimex

### Grant Review Panels

National Council of Research and Technology (CONACyT, Mexico)	2018
Member of the Reviewers Panel for the Basic Science Research Call (the largest call at National Level)	

Mexican Academy of Sciences	2017-2019
Reviewer candidates for the call "Summer of Research" program	

National Council of Research and Technology (CONACyT, Mexico)	2012-2020
Reviewer of individual projects and candidates for several calls	

### Conference Organization (Bi-national Meetings)

Co-organizer (together with Prof. Jochen Büchs and Octavio T. Ramírez) of the German-Mexican workshop on the integration of microbial physiology and bioprocess technology	2018
Sponsored by CONACyT (Mexico) and DFG (Germany)	

## SERVICE AT THE UNIVERSIDAD AUTÓNOMA METROPOLITANA

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Committee for the planning of the BSc academic programmes	2012
Committee for the development of the new Postgraduate program at UAM	2010-15
Committee for the evaluation of academic employees'	2012-2014 and 2018-2020
Faculty Search Committee	2015-19