


# Andrea Quezada, PhD.


## Curriculum Vitae

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 Andrea Quezada

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## Research Interests

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My research is focused on studying the self-assembly protein modules as the root cause of disease and to use this knowledge as a tool in synthetic biology to develop new diagnostics and therapeutic technologies. I use an interdisciplinary approach that includes cell-models, *in vitro* and *in vivo* biophysical assays, molecular simulations and protein engineering.

## Education, Research and Professional Experience

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- **2021 - present. Invited researcher.** Bionanotechnology and macromolecules Laboratory. Institute of Chemistry. National Autonomous University of Mexico *Subject:* New diagnostic tools based in CRISPR-Cas and isothermal amplification
- **2019 - 2021. Postdoctoral researcher.** Cell Structure and Dynamics Laboratory. Faculty of Science. University of Lisbon, Portugal. *Subject:* Influence of phosphorylation on huntingtin aggregation in a human cell line.
- **2018 - 2019. Invited researcher.** Biomolecular Self-Organization Laboratory. Institute of Chemical and Biological Technology. NOVA University of Lisbon. Portugal. *Subject:* Molecular mechanism of ATP as an hydrotrope in A $\beta$  aggregation.
- **2018. Invited researcher.** Department of Biochemistry and Structural Biology. Institute of Cell Physiology. The National Autonomous University of Mexico. Mexico. *Subject:* Proprotein convertases dynamics upon inhibition by serpins.
- **2012 - 2017. Project Manager.** Mexican Protein Society. **2017 - 2018.**
- **Ph.D.** Biophysical Chemistry Laboratory, Faculty of Chemistry, The National Autonomous University of Mexico, Mexico\*. *Subject:* Flexibility and aggregation of ( $\beta\alpha$ )<sub>8</sub> barrels.
- **2012. Research visitor.** Soft Matter and Molecular Biophysics Group, Department of Applied Physics, Faculty of Physics, University of Santiago de Compostela, Spain. *Subject:* Microsecond-long all-atom molecular dynamics simulations of ( $\beta\alpha$ )<sub>8</sub> barrels
- **2009 - 2011. M.Sc.** Department of Biochemistry and Structural Biology, Institute of Cell Physiology, The National Autonomous University of Mexico. Mexico. *Subject:* Design of ( $\beta\alpha$ )<sub>8</sub> barrels chimeraes
- **2009 - 2010. Research visitor.** Department of Chemistry and Physics, Faculty of Science, University of Granada. Granada, Spain. *Subject:* Protein Kinetic stability using an automated DSC

- **2003 - 2008. B.Sc.** Department of Macromolecules, Institute of Chemistry, The National Autonomous University of Mexico. Mexico. *Dissertation Subject:* High-quality protein crystals using internal electric fields and cyclic voltammetry

## Publications

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### JCR-indexed Journal Articles

- [1] Guilherme G. Moreira, François-Xavier Cantrelle, **Andrea Quezada**, Filipa S. Carvalho, Joana S. Cristóvão, Urmi Sengupta, Nicha Puangmalai, Ana P. Carapeto, Mário S. Rodrigues, Isabel Cardoso, Günter Fritz, Federico Herrera, Rakez Kaye, Isabelle Landrieu, and Cláudio M. Gomes. Dynamic interactions and  $Ca^{2+}$ -binding modulate the holdase-type chaperone activity of s100b preventing tau aggregation and seeding. *Nature Communications*, 12(1), **2021**.
- [2] Gonzalo Izaguirre, Marcelino Arciniega, and **Andrea Quezada**. Specific and Selective Inhibitors of Proprotein Convertases Engineered by Transferring Serpin B8 Reactive-Site and Exosite Determinants of Reactivity to the Serpin  $\alpha 1PDX$ . *Biochemistry*, 58(12):1679–1688, **2019**.
- [3] **Andrea Quezada\***, Nallely Cabrera, Ángel Piñero, A Jessica Díaz-Salazar, Selma Díaz-Mazariegos, Sergio Romero-Romero, Ruy Pérez-Montfort, and Miguel Costas. A strategy based on thermal flexibility to design triosephosphate isomerase proteins with increased or decreased kinetic stability. *Biochemical and Biophysical Research Communications*, 503(4):3017–3022, **2018**.
- [4] Valeria Guzmán-Luna, **Andrea Quezada**, A. Jessica Díaz-Salazar, Nallely Cabrera, Ruy Pérez-Montfort, and Miguel Costas. The effect of specific proline residues on the kinetic stability of the triosephosphate isomerases of two trypanosomes. *Proteins: Structure, Function, and Bioinformatics*, 85(4):571–579, **2017**.
- [5] **Andrea Quezada**, A Jessica Díaz-Salazar, Nallely Cabrera, Ruy Pérez-Montfort, Ángel Piñero, and Miguel Costas. Interplay between Protein Thermal Flexibility and Kinetic Stability. *Structure*, 25(1):167–179, **2017**.

\* *Co-corresponding author*

### Publications under review

- [6] Maria Hoyer, Alvaro Crevenna, Jose Rafael Cabral Correia, **Andrea Quezada**, and Don Lamb. Using Zero-mode waveguides to visualize the first steps during gelsolin-mediated actin filament formation. *Biophysical Journal*.

### Book Chapters

- [7] **Andrea Quezada**, Roberto Arreguín-Espinosa, and Abel Moreno. *Springer Handbook of Crystal Growth*, chapter Protein Crystal Growth Methods, pages 1583–1605. Springer Berlin Heidelberg, 1st edition, **2010**.

### Conference Proceedings

- [8] Miguel Costas, **Andrea Quezada**, and Ángel Piñero. Interplay between protein kinetic stability and thermal flexibility. In *42nd FEBS Congress: from molecules to cells and back*, volume 284. FEBS Press, **2017**.

- [9] Miguel Costas Angel Piñeiro and **Andrea Quezada**. Key structural differences between tbtim and tctim revealed by thermal unfolding molecular dynamics simulations. In *29th Annual Symposium of the Protein-Society*, volume 24. Wiley Online Library, **2015**.

### **Publications in preparation**

- [10] **Andrea Quezada**, Joana Branco Santos, Daria Kovalchuk, and Federico Herrera. An integrated framework for Huntingtin aggregation: from classic amyloidogenesis to phase transitions in the cell. *Frontiers in Molecular Neuroscience*.
- [11] **Andrea Quezada**, Daria Kovalchuk, and Federico Herrera. N-terminal phosphorylation of huntingtin exon 1 shifts its liquid-liquid phase separation diagram and alters the kinetics of aggresome formation in mammalian cells.

### **Awards, Fellowships and Honors**

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- 2021 **Diversity Award** granted by The Protein Society
- 2018-2021 **Fellowship** from the Mexican Federal Government for a postdoctoral stay awarded by the National Council of Sciences and Technology (CONACyT)
- 2017-2018 **Grant** from the Mexican Federal Government under the *Thematic Networks Program* awarded by the National Council of Sciences and Technology (CONACyT)
- 2017 **Cum Laude** PhD dissertation: "Protein flexibility and kinetic stability: the Trypanosomatidae's Triosephosphate Isomerase case"
- 2016 **Grant** from the Mexican Federal Government under the *Research Assistants Program* awarded by the National Investigators System (SNI)
- 2012-2015 **Fellowship** from the Mexican Federal Government for PhD studies awarded by the National Council of Sciences and Technology (CONACyT)
- 2012 **Fellowship** from the Mexican Federal Government for a short research stay at the University of Santiago de Compostela, Spain
- 2012 **Travel Award** from the Biochemistry PhD Program at UNAM for a short research stay at the University of Santiago de Compostela, Spain
- 2010-2012 **Fellowship** for MsC studies granted by the Mexican National Council of Sciences and Technology (CONACyT)
- 2009 **Fellowship** from the Mexican Federal Government for a short research stay at the University of Granada, Spain
- 2009 **Travel Award** from the Biochemistry PhD Program at UNAM for a short research stay at the University of Granada, Spain
- 2008 **Cum Laude** Bachelor dissertation: "Growing protein crystal under electric fields"
- 2008 **Travel Award** to attend the 12th International Conference on the Crystallization of Biological Macromolecules awarded by the organizer committee.
- 2007-2008 **Grant** under the *Research Assistant Program* awarded by the National Investigators System (SNI) for undergraduate research stay at the Institute of Chemistry, UNAM

## Volunteering

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- 2020 **COVID Testing Centre** at the Faculty of Science of the University of Lisbon.

## Skills

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### Technical

- Atomic Force Microscopy, Widefield and Confocal Fluorescence Microscopy, Dynamic Light Scattering, Circular Dichroism, Differential Scanning Calorimetry, Isothermal Scanning Calorimetry, PCR, Immunocytochemistry, WB.

### Bench

- Mammalian Cell Culture, Live-Cell Imaging, Molecular Biology, Protein Engineering, Biochemical Assays, Flow Cytometry

### Computer

- Programming: Python, R, MATLAB
- Typography: L<sup>A</sup>T<sub>E</sub>X, Markdown, LibreOffice/OpenOffice, Microsoft Office
- Other: ImageJ scripting, UNIX scripting, numpy, Gromacs, AMBER

## Teaching and Tutoring

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- **Tutoring** 2020 Bachelor and PhD students at the Faculty of Science, University of Lisbon, Portugal
- **Tutoring** 2019 PhD students at ITQB-NOVA, Oeiras, Portugal
- **Tutoring** 2020 *Daria Kovalchuk* (Bachelor student). Cell Structure and Dynamics Laboratory, Faculty of Science, University of Lisbon, Portugal
- **Tutoring** 2019 *Fabiana Miraglia* (PhD student). Cell Structure and Dynamics Laboratory, Faculty of Science, University of Lisbon, Portugal
- **Tutoring** 2019 *Silvia Galderisi* (PhD student). Biomolecular Self-Organization Laboratory, ITQB-NOVA, Oeiras, Portugal
- **Invited lecturer** Nov 2018. Biochemistry Grad School. Class Title “Protein purification and characterization techniques”. Institute of Cell Physiology, The National Autonomous University of Mexico, Mexico City. *Subject*: Protein Thermodynamics.
- **Lecturer** Ago 2013 - Nov 2018 Thermodynamics. Undergraduate course at Faculty of Chemistry. UNAM, Mexico City.

## Communications

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### Oral communications and invited talks

1. Guilherme G. Moreira, **Andrea Quezada**, Federico Herrera, Claudio M. Gomes. The S100B chaperone precludes formation of Tau puncta and liquid-liquid phase separation. *PhasAGE International Conference "Phase transitions in aging and age-related diseases"*. Online event. **2021**.

2. **Andrea Quezada**, Daria Kovalchuk, Federico Herrera. N-terminal phosphorylation of Huntingtin exon 1 shifts its liquid-liquid phase separation diagram and alters the kinetics of aggresome formation in mammalian cells *XXI SPB Biochemistry Congress 2020. Online event. 2020.*
3. **Andrea Quezada**. Invited talk: "Huntingtin aggregation in live cells: amyloidogenesis, phase separation and aggresomes" 3er Coloquio en Materiales de Interés Biotecnológico "Perspectivas en la Salud Humana" (CMIB-2020), *Universidad de Sonora, Mexico. 2020.*
4. **Andrea Quezada**. Invited talk: "How to modify the kinetic stability of proteins using molecular dynamics simulations?" Instituto Potosino de Investigación Científica y Tecnológica A.C., *San Luis Potosí, Mexico. 2017.*
5. **Andrea Quezada**, Jessica Diaz-Salazar, Nallely Cabrera, Ruy Perez-Montfort, Ángel Piñeiro and Miguel Costas. Interplay between Protein Thermal Flexibility and Kinetic Stability. *6th Congress of the Mexican Protein Society, Durango, Mexico. 2017.*
6. **Andrea Quezada**, Nallely Cabrera, Ruy Perez-Montfort, Ángel Piñeiro and Miguel Costas. The structural basis of protein kinetic stability: the Trypanosomatidae's TIM case. *4th Congress of the Mexican Protein Society, Guanajuato, Mexico. 2013.*

## Poster communications

1. Miguel Costas, **Andrea Quezada**, and Ángel Piñeiro. Interplay between protein kinetic stability and thermal flexibility. *42nd FEBS Congress: from molecules to cells and back, Jerusalem, Israel. 2017*
2. Angel Piñeiro, Miguel Costas and **Andrea Quezada**. Key structural differences between TbTIM and TcTIM revealed by thermal unfolding molecular dynamics simulations. *29th Annual Symposium of the Protein-Society, Barcelona, Spain. 2015*
3. **Andrea Quezada**, Angel Piñeiro and Miguel Costas. Temperature-induced unfolding molecular dynamics simulations of the triosephosphate isomerase of *Trypanosoma cruzi* and *Trypanosoma brucei*. *XXIX Congress of the Mexican Biochemistry Society, Oaxaca, Oaxaca. 2012*
4. **Andrea Quezada** and Miguel Costas. Kinetic stability of TIM chimeric enzymes. *3rd Congress of the Mexican Protein Society, Mexico City, Mexico. 2011.*
5. **Andrea Quezada** and Miguel Costas. Kinetic stability of chimeric enzymes from the triosephosphate isomerase of *Trypanosoma cruzi* and *Trypanosoma brucei*. *XXVIII Congress of the Mexican Biochemistry Society, Tuxtla Gutiérrez, Chiapas. 2011.*
6. **Andrea Quezada** and Abel Moreno. Effect of an electromagnetic field on the crystallization of ferritin. *12th International Conference on the Crystallization of Biological Macromolecules, Cancún, México. 2008.*

## Outreach activities

- 2020 - Short communication "N-terminal phosphorylation of Huntingtin exon 1: liquid-liquid phase separation and aggresome formation in mammalian cells". Ciências Research Day, Faculty of Science, University of Lisbon, Portugal.
- 2019 - present **Científicas Mexicanas en el Extranjero** Member & Co-Founder. Twitter: @MexiCiencia. Website: <https://mexiciencia.github.io>
- 2017-2018 Project Manager at the Mexican Protein Society

- i. 10 Schools on Protein Science in ten different states of Mexico, with 1,534 students and 43 national speakers.
- ii. 6 Workshops on Protein Science in four different states of the country, with 292 attendees, 30 national speakers and nine international speakers.
- iii. 2 Annual Meetings of the Mexican Protein Society with 82 attendees.
- iv. 2 Meetings to promote links between Academy, Industry and Decision-makers with 82 attendees.

## Research grants

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## Memberships

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- The Protein Society (2021)
- Mexican Bioinformatics Network (2021)
- Portuguese Biochemistry Society (2020)
- Mexican Protein Society (2018-present)
- Mexican Biochemistry Society (2012-2016)

## Other Professional activities

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## Training and Courses

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- **Introduction to GitHub for R** (2021) Mexican Bioinformatics Network - 3.5 hrs
- **Grant Writing Course** (2019) Instituto de Tecnología Química e Biológica - 18 hrs
- **Python Course** by Dr. Manuel Nuno Melo (2018) Instituto de Tecnología Química e Biológica - 16 hrs
- **Workshop on Single-molecule techniques** (2018) Institute of Biotechnology, Universidad Nacional Autónoma de México, Cuernavaca, Morelos, Mexico - 30 hrs
- **Workshop on Nuclear Magnetic Resonance of Proteins** (2018) - Centro de investigación de estudios avanzados, Mexico City - 22 hrs
- **Introduction to Scientific Advice for Policy Making** (2018) - Centro de investigación de estudios avanzados, Mexico City - 18 hrs
- **Course in Molecular modelling and dynamics** by Dr. Marcelino Arciniega (2018) - Institute of Cell Physiology - Universidad Nacional Autónoma de México - 48 hrs
- **Minicourse in Protein Physics** by Dr. Paolo Carloni (2017) - Cuernavaca, Mexico. - 20 hrs
- **Workshop on X-ray Scattering in Biology and Material Science** (2017) Institute of Chemistry, Universidad Nacional Autónoma de México - 8 hrs
- **Workshop on Enhanced Sampling Molecular Dynamics Simulations** (2017) Faculty of Chemistry, Universidad Nacional Autónoma de México - 20 hrs
- **Course in Intellectual property rights and Entrepreneurship in Biotechnology** (2017) Institute of Biotechnology, Universidad Nacional Autónoma de México, Cuernavaca, Morelos, Mexico - 8 hrs

- **3rd USA-Mexico Workshop in Biological Chemistry: Protein Folding, Dynamics and Function** (2013) Guanajuato, Mexico - 20 hrs
- **2nd USA-Mexico Workshop in Biological Chemistry: Protein Folding, Misfolding and Design** (2011) Universidad Nacional Autonoma de Mexico, Mexico. March 18-21
- **Introduction to Molecular Dynamics Simulations Workshop** by Dr. Angel Pineiro (2011) - Faculty of Chemistry, Universidad Nacional Autonoma de Mexico - 16 hrs
- **International School on Macromolecules Crystallization** (2008) Cancún, México - 16 hrs

## Languages

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- Spanish - Native speaker
- English - Speaking: Advanced (C1); Reading: Advanced (C1); Writing: Advanced (C1); Listening: Advanced (C1); Peer-review: Advanced (C1)
- Portuguese - Speaking: Intermediate (B1); Reading: Upper Intermediate (B2); Writing: Elementary (A2); Listening: Intermediate (B1); Peer-review: Beginner (A1)

\* According to Europass Standards (<http://europass.cedefop.europa.eu/LanguageSelfAssessmentGrid/en>)

## Referees

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| <ul style="list-style-type: none"> <li>• Professor Federico Herrera<br/>Cell Structure and Dynamics Laboratory<br/>Faculty of Sciences, University of Lisbon<br/>Phone: (+351) 92 500 9786<br/>Email: fherrera@fc.ul.pt</li> </ul>                       | <ul style="list-style-type: none"> <li>• Professor Marcelino Arciniega<br/>Biochemistry and Structural Biology<br/>Institute of Cell Physiology<br/>National Autonomous University of Mexico<br/>Phone: +52 55 56 22 57 00<br/>Email: marciniega@ifc.unam.mx</li> </ul> |
| <ul style="list-style-type: none"> <li>• Professor Claudio M. Gomes<br/>Protein Misfolding and Amyloids in Biomedicine<br/>Laboratory<br/>Faculty of Sciences, University of Lisbon<br/>Phone: (+351) 21 750 0256<br/>Email: cmgomes@fc.ul.pt</li> </ul> | <ul style="list-style-type: none"> <li>• Professor Armando Hernandez<br/>Chemistry of Biomacromolecules<br/>Institute of Chemistry<br/>National Autonomous University of Mexico<br/>Phone: +52 55 56 22 45 48<br/>Email: armandohg@iquimica.unam.mx</li> </ul>          |