HERDELINE ANN M. ARDOÑA

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RESEARCH INTERESTS

Bioinspired materials, adaptive materials, cardiac tissue engineering, optoelectronics, nanotechnology

PROFESSIONAL APPOINTMENTS AND EDUCATION

2020– **University of California, Irvine**
Assistant Professor, Department of Chemical and Biomolecular Engineering
Joint appointments (by courtesy): Department of Biomedical Engineering and Department of Chemistry
Member, Sue & Bill Gross Stem Cell Research Center (SCRC)
Affiliate Member, Cardiovascular Innovation and Research Center (CIRC)
Member, Chemical and Materials Physics (ChaMP) Program

2017– 2020 **Harvard University**
ACS Irving S. Sigal Postdoctoral Fellow, Disease Biophysics Group

2012– 2017 **Johns Hopkins University**
Ph.D. Chemistry (with Certificate for Advanced Studies in Nanobiotechnology, 2016)

University of the Philippines Diliman
2011– 2012 Instructor 5, Institute of Chemistry, College of Science
2007– 2011 B.S. Chemistry, *summa cum laude*

SELECTED AWARDS AND HONORS

- NSF CAREER Award **(2023– 2028)**
- Hellman Fellowship Award **(2023–2024)**
- IUPAC Young Observer **(2023)**
- Chemical and Biomolecular Engineering Professor of the Year, UCI Engineering Student Council **(2022– 2023)**
- 12th Irving S. Sigal Postdoctoral Fellow, American Chemical Society **(2018– 2020)**:
  Awarded every two years to one outstanding postdoctoral fellow pursuing research at the chemistry-biology interface
- International Student Research Fellowship, Howard Hughes Medical Institute (HHMI) **(2015– 2017)**
- Faculty for the Future Fellowship, Schlumberger Foundation **(2014– 2017)**
- Emmett and Elsie Buhle Fellowship Award, Johns Hopkins University **(2014)**:
  Annually given to one Chemistry graduate student in acknowledgement of excellent academic performance
- Leticia Shahani Award for Best Undergraduate Thesis, UP Diliman **(2011)**
- Bank of the Philippine Islands-Department of Science and Technology: Science Award, Philippines **(2010)**:
  Annually given to 30 student researchers in the Philippines who excel in science and engineering
- Baldomero M. Olivera, Jr. and Lourdes J. Cruz Award, UP Diliman **(2010)**:
  Annually given to two highest ranking B.S. Chemistry seniors of the Institute of Chemistry, UP Diliman
- National Scholarship Program, Commission on Higher Education, Philippines **(2007– 2011)**

PUBLICATIONS

(**denotes equal contribution*; *⊥undergraduate co-authors, †corresponding author*)
https://www.ncbi.nlm.nih.gov/myncbi/herdeline.ardona.2/bibliography/public/

[31] S. Lim, D.L.M. Cordova, A.S. Robang, Y. Kuang, A.K. Paravastu, M.Q. Arguilla, **H.A.M. Ardoña**†, "Thermochromic behavior of polydiacetylene nanomaterials driven by charged peptide amphiphiles," **2023**, *under revision*. available in ChemRxiv: 10.26434/chemrxiv-2023-4mh7l

[30] S. Choi, K.Y. Lee, S.L. Kim, L.A. MacQueen, H. Chang, J.F. Zimmerman, Q. Jin, M.M. Peters, **H.A.M. Ardoña**, X. Liu, A.-C. Heiler, R. Gabardi, C. Richardson, W.T. Pu, A.R. Bausch, K.K. Parker, "Pre-fabricated fiber infused gel scaffolds guide cardiomyocyte alignment in 3D printed ventricles," **2023,** *Nat. Mater., in press.*

[29] Y. Kuang, Z.-F. Yao, S. Lim, C. Ngo, **H.A.M. Ardoña**†, "Biomimetic sequence-templating approach towards a multiscale modulation of chromogenic polymer properties," *Macromolecules,* **2023**, *in press* (selected as a supplementary cover).

[28] V. V. Vurro, K. Shani, **H.A.M. Ardoña**, J. F. Zimmerman, V. Sesti, K.Y. Lee, Q. Jin, C. Bertarelli, K.K. Parker, G. Lanzani, "Light-triggered cardiac microphysiological model," *APL Bioengineering* (featured article), **2023**, *in press*.

[27] Z.-F. Yao, Y. Kuang, **H.A.M. Ardoña**†, "Carbodiimide-fueled assembly of π-conjugated peptides regulated by electrostatic interactions," *ChemSystemsChem* (selected for the *Systems Chemistry in the USA* special collection, *Chemistry Europe Editor's Choice: Spotlights*, and as front cover), **2023**, e202300003.

[26] K.L. Lacy, S. Salib, M. Tran, T. Tsai, R. Valentine, **H.A.M. Ardoña**, T.N.G. Adams "Light-induced dielectrophoresis for characterizing the electrical behavior of human mesenchymal stem cells," *J. Vis. Exp.*, **2023**, [link] *in press.*

[25] Z.-F. Yao, E. Lundqvist, Y. Kuang, **H.A.M. Ardoña**†, "Engineering multi-scale organization for biotic and organic abiotic electroactive systems," *Adv. Sci.* **2023**, 2205381.

[24] H. Chang,* Q. Liu,* J.F. Zimmerman,* K.Y. Lee, Q. Jin, M.M. Peters, S. Choi, S.L. Kim, **H.A.M. Ardoña**, L.A. MacQueen, C.O. Chantre, S.E. Motta, E.M. Cordoves, G.J. Touloumes, K.K. Parker, "Recreating the heart's helical structure-function relationship with focused rotary jet spinning," *Science,* **2022**, 377, 180.

[23] **H.A.M. Ardoña**, J.F. Zimmerman, K. Shani, F. Eweje, S.-H. Kim, D. Bitounis, D. Parviz, E. Casalino, M. Strano, P. Demokritou, K.K. Parker, "Differential modulation of endothelial cytoplasmic projections after exposure to graphene-based nanomaterials," *NanoImpact,* **2022,** 100401.

[22] K.Y. Lee,* S.-J. Park,* D.G. Matthews, S.L. Kim, C. A. Marquez,⊥ J.F. Zimmerman, **H.A.M. Ardoña**, A.G. Kleber, G.V. Lauder, K.K. Parker, "An autonomous, humanized fish based on cardiac biophysics," *Science*, **2022**, 375, 639.

[21] S. Lim, Y. Kuang, **H.A.M. Ardoña**†. "Evolution of supramolecular systems towards next-generation biosensors," *Front. Chem.* (part of the special issue on International Women of Supramolecular Chemistry), **2021**, 9, 723111.

[20] M. Yadid, J.U. Lind, **H.A.M. Ardoña**, S.P. Sheehy, L.E. Dickinson, F. Eweje,⊥ M.M.C. Bastings, B.D. Pope, B. B. O'Connor, J.R. Straubhaar, B. Budnik, A.G. Kleber and K.K. Parker, "Endothelial extracellular vesicles contain protective proteins and rescue ischemia-reperfusion-injury in a human heart-on-chip," *Sci. Transl. Med.*, **2020**, 12, 565, eaax8005.

[19] S. Ahn, C.O. Chantre, **H.A.M. Ardoña**, G.M. Gonzalez, P.H. Campbell, K.K. Parker, "Biomimetic and estrogenic fibers promote skin regeneration via estrogen receptor β," *Biomaterials,* **2020**, 255, 120149.

[18] G.J. Touloumes,* **H.A.M. Ardoña**,* E.K. Casalino,⊥ J.F. Zimmerman, C.O. Chantre, D. Bitounis, P. Demokritou and K.K. Parker, "Mapping 2D- and 3D-distributions of metal/metal oxide nanoparticles within cleared human ex vivo skin tissues," *NanoImpact*, **2020**, 17, 100208.

[17] B.B. O'Connor,* T. Grevesse,* J.F. Zimmerman, **H.A.M. Ardoña**, J.A. Jimenez,⊥ K.K. Parker, "Human microvascular endothelial cell pairs model tissue-level blood-brain barrier function," *Integr. Biol.*, **2020**, 12, 64.

[16] F. Eweje,*⊥ **H.A.M. Ardoña**,* J.F. Zimmerman, B.B. O'Connor, S. Ahn, T. Grevesse, K.N. Rivera,⊥ D. Bitounis, P. Demokritou and K.K. Parker, "Quantifying the effects of engineered nanomaterials on endothelial cell architecture and vascular barrier integrity using a cell pair model," *Nanoscale*, **2019**, 11, 17878.

[15] T.S. Kale,* **H.A.M. Ardoña**,* A. Ertel⊥ and J.D. Tovar, "Torsional impacts of peptidic nanostructures imposed within confined quaterthiophene segments," *Langmuir*, **2019**, 35, 2270.

[14] S. Ahn, **H.A.M. Ardoña**, P.H. Campbell, G.M. Gonzalez, K.K. Parker, "Alfalfa nanofibers for dermal wound healing," *ACS Appl. Mater. Interfaces*, **2019**, 11, 33535.

[13] J.F. Zimmerman, **H.A.M. Ardoña**, G. Pyrgiotakis, J. Dong, B. Moudgil, P. Demokritou, K.K. Parker, "Scatter enhanced phase contrast microscopy for discriminating mechanisms of active nanoparticle transport in living cells," *Nano Lett.*, **2019**, 19, 793 (cover article).

[12] S. Ahn, **H.A.M. Ardoña**, J.U. Lind, F. Eweje,⊥ S.L. Kim, G. M. Gonzalez, Q. Liu, J.F. Zimmerman, G. Pyrgiotakis, Z. Zhang, J. Beltran, B. Moudgil, P. Capinone, P. Demokritou and K.K. Parker, "Mussel-inspired 3D fiber scaffolds for heart-on-a-chip toxicity studies of engineered nanomaterials," *Anal. Bioanal. Chem.* (invited article and front cover for *Analytical Advances in Sustainable and Safe Nanotechnology* issue), **2018**, 410, 6141.

[11] **H.A.M. Ardoña**,* T.S. Kale,* A. Ertel⊥ and J.D. Tovar, "Non-resonant and local field effects on the photophysics of oligo(*p*-phenylenevinylene) segments within peptidic nanostructures," *Langmuir*, **2017**, 33, 7435.

[10] **H.A.M. Ardoña**, E.R. Draper, F. Citossi, M. Wallace, L. Serpell, D.J. Adams, and J.D. Tovar, "Kinetically controlled coassembly of multichromophoric peptide hydrogelators and the impacts on energy transport," *J. Am. Chem. Soc.* **2017**, 139, 8685.

[9] Y. Zhou, B. Li, S. Li, **H.A.M. Ardoña**, W.L. Wilson, J.D. Tovar, C.M. Schroeder "Concentration-driven assembly and sol–gel transition of π-conjugated oligopeptides," *ACS Cent. Sci.*, **2017**, 3, 986.

[8] B. Li, S. Li, Y. Zhou, **H.A.M. Ardoña**, L.R. Valverde, W.L. Wilson, J.D. Tovar, C.M. Schroeder, "Non-equilibrium self-assembly of π-conjugated oligopeptides in solution," *ACS Appl. Mater. Interfaces*, **2017**, 9, 3977.

[7] W. Liyanage, **H.A.M. Ardoña**, H.-Q. Mao, and J.D. Tovar, "Cross-linking approaches to tune the mechanical properties of peptide π-electron hydrogels," *Bioconjugate Chem.* (part of the *Peptide Conjugates for Biological Applications* special issue), **2017**, 28, 751.

[6] **H.A.M. Ardoña** and J.D. Tovar, "Peptide pi-electron conjugates: organic electronics for biology?" *Bioconjugate Chem.* (cover article), **2015**, 26, 2290.

[5] K. Besar,* **H.A.M. Ardoña**,* J.D. Tovar and H.E. Katz, "Demonstration of hole transport and voltage equilibration in self-assembled pi-conjugated peptide nanostructures using field-effect transistor architectures." *ACS Nano*, **2015**, 9, 12401.

[4] **H.A.M. Ardoña**, K. Besar, M. Togninalli,⊥ H.E. Katz and J.D. Tovar, "Sequence-dependent mechanical, photophysical and electrical transport properties of pi-conjugated peptide hydrogelators." *J. Mater. Chem. C* (part of a special themed collection: *Bioelectronics* and 2015 *Journal of Materials Chemistry C Hot Papers*), **2015**, 3, 6505.

[3] **H.A.M. Ardoña** and J.D. Tovar, "Energy transfer within pi-conjugated peptide heterostructures in aqueous environments" *Chem. Sci.*, **2015**, 6, 1474.

[2] B.D. Wall, Y. Zhou, S. Mei, **H.A.M. Ardoña**, A.L. Ferguson and J.D. Tovar, "Variation of formal hydrogen bonding networks within electronically delocalized pi-conjugated oligopeptide nanostructures" *Langmuir*, **2014**, 30, 11375.

[1] **H.A.M. Ardoña**,⊥ F.U. Paredes, I.H.J. Arellano and S.D. Arco, "Electrospun PET supported-ionic liquid-stabilized CdS catalyst for the photodegradation of Rhodamine B under visible light" *Mater. Lett.*, **2013**, 91, 96.

PATENT

[1] J.D. Tovar, H.E. Katz, **H.A.M. Ardoña**, A.M. Sanders, K. Besar, "Energy transporting pi-conjugated peptide nanomaterials" U.S. Patent #10,316,060.

SUPPORT

2023– 2028 "CAREER: Harnessing Dynamic Cell-Scaffold Interactions to Develop Adaptive Biohybrid Systems" (NSF DMR #2239647, H.A.M. Ardoña, PI)

2023–2024 "Wiring-Up Muscle Tissues for Advancing the Manufacturing of Cultured Meats" (Society of Hellman Fellows Fund- H.A.M. Ardoña, PI)

2022– 2027 "Optically Promoting Cardiac Maturation Using Engineered Peptides" (NIH NHLBI #1R56HL164348 – 01; #1R01HL164348-01A1- H.A.M. Ardoña, PI)

2022– 2026 "RECODE: Spatial Engineering of Morphogens for the Reproducible Formation of Cortical Organoids with Arealization" (NSF CBET #2225624- M. Watanabe, PI; H.A.M. Ardoña and M. Gandal, co-PI)

2021– 2022 "Directed Self-Assembly of Optoelectronic Peptides on Nanostructured Polymeric Surfaces" (NSF MRSEC-CCAM Seed Grant Program- H.A.M. Ardoña, PI; A.F. Yee, co-PI)

2021– 2023 Interim COVID-19 Research Recovery Program (ICRRP), UCI Office of the Provost and Executive Vice Chancellor

2021– 2023 UCI Council on Research, Computing, and Libraries (CORCL) Research Award

SELECTED SERVICE ACTIVITIES

- Peer review referee: *ACS Nano; APL Bioengineering; Bioconjugate Chemistry; Bioelectricity; Biomacromolecules; Biomaterials; Journal of Controlled Release; NanoImpact; Nature; SciEnggJ (Philippines)*
- Conference symposium organizer: 2023 MRS Fall Meeting (*lead*); 2022 MRS Fall Meeting; 2022 Society for Biomaterials Spring Meeting; 2021 MRS Fall Meeting
- NSF ASCEND Mentor **(2023–)**
- Co-Director, Future Faculty Workshop: Preparing Diverse Leaders for the Future, NSF DMR #2226708 **(2022–)**
- Mentor, Chemistry Women Mentorship Network (ChemWMN) **(2020–)**
- Mentor and Advisory Board Member, GradMAP Mentoring Network- Philippines **(2020–)**