

# Chia-Pei Denise Hsu

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## WORK AND RESEARCH EXPERIENCES

**Sr. Product Development Engineer**, Aug 2023 – Present

Noble / Aptar Pharma, Orlando, FL

- Designed self-administered medical device solutions for patients with chronic health conditions
- Generated prototypes and conducted design review meetings with clients to progress product development through design stages
- Established new supplier relations to diversify long-term partnerships, enhancing flexibility within company supply chain
- Wrote in-depth technical SOPs compliant with manufacturing standards, ensuring stringent regulatory adherence and quality control
- Drafted product design specifications and reviewed quality control plans (QCP) on SharePoint and EtQ quality management software
- Maintained design history files (DHF), developed and executed design verification test plans for various product platforms
- Collaborated with counterparts on the broader corporate engineering team across other continents within the firm

**Postdoctoral Associate**, Jan 2023 – Jun 2023

University of Pittsburgh, Pittsburgh, PA

- Conducted research on microrobots, machine learning, and synthetic biology

**Graduate Biomedical Engineering Research/Teaching Assistant**

Florida International University, Miami, FL, Aug 2017 – Dec 2022

- Investigated effects of calcification due to fluid oscillatory shear stress on paracrine signaling between cardiovascular cell types conditioned in a microfluidic shear assay system and a bioreactor
- Optimized protocols to maintain multiple mammalian cell lines (VECs, VICs, VasECs, VasSMCs, HBMSCs) for experimentation and cryopreservation
- Performed gene and protein expressions on conditioned cells and tissues using RT-qPCR, ELISA, Western blot, histology, and immunostaining
- Designed and fabricated a bioreactor using SolidWorks and ANSYS CFD to facilitate 3D tissue culture under physiologically relevant flow environments
- Assessed hydrodynamic functions of heart valves with regenerative capacities using valvular cells seeded in bio-scaffolds conditioned in a bioreactor
- Collaborated cross-functionally on RNA sequencing cellular response studies, enhancing rigor in gene expression results
- Mentored five junior lab assistants in cell culture and experimentation, contributing to progression of multiple grants, publications, and conference presentations
- Class Teaching Assistant: Biomedical Engineering Transport (5 semesters), Cell and Tissue Engineering with Lab (3 semesters)
- Provided peer review feedback on journal publication submissions relevant to field of research

**R&D Product Mechanical Engineer**, Oct 2013 – Jul 2017

Pegatron Corporation / Starlink Electronics Corp, Taiwan

- Used ProE and AutoCad to model and simulate electronic connector parts
- Assisted manufacturing teams on designing automated assembly lines
- Prepared and enforced vendor material quality control: GD&T and material testing (parts from injection molding, stamping, threading, electroplating)
- Implemented ISO 9001 QMS and UL product quality standards
- Prepared FMEA and root cause and corrective action (8D) reports
- Maintained technical contracts and submitted royalty reports

**Mechanical Engineer**, Aug 2011 – Aug 2013

Bechtel Corporation / PECL / Nuclear Power Plant / Mining & Metals, Taiwan

- Used SmartPlant P&ID and MicroStation to design P&IDs and PFDs
- Applied numerical methods to determine equipment and pipeline sizes for air, water, cooling, and heat exchanger systems (eg. valves, motors, conduits)
- Drafted calculation sheets, technical specs, material requisition documents
- Performed on-site plant walk-downs, proposed alternative structural designs

**Product Support Specialist / Auction Admin**, Jun 2009 – Jun 2011

Ariba, Inc., Pittsburgh, PA

- Provided sourcing and procurement software functional support on site navigation and system troubleshooting
- Monitored online live auctions, managed buyer and supplier market integrity
- Collaborated with realm enablement and site integration teams
- Conducted weekly internal product training sessions

## EDUCATION

**Doctor of Philosophy in Biomedical Engineering**

Florida International University

Miami, FL, USA

Aug 2017 – Dec 2022

**Master of Science in Mechanical Engineering**

Carnegie Mellon University

Pittsburgh, PA, USA

May 2008 – Dec 2008

**Bachelor of Science in Mechanical Engineering & Biomedical Engineering**

Carnegie Mellon University

Pittsburgh, PA, USA

Aug 2004 – May 2008

## SKILLS

**Laboratory:** Cell isolation,

cell culture, DNA/RNA

extraction, gene/protein

expression, histology,

immunofluorescent staining

**Languages:** English,

Taiwanese, Mandarin Chinese,

Spanish (conversant)

**Equipment:** Autoclave,

Bioflux, Vivitro, Bioreactor,

Confocal microscope, Arduino,

3D printing, Cryostat, Lathe,

Milling machine, Band saw,

Drill press

**Software:** MS Office,

SolidWorks (CSWP certified),

Creo/ProE, ANSYS,

MicroStation, AutoCad,

SmartPlant P&ID, SPSS,

MATLAB, R, Java, C++,

HTML, quality/project

management software

## LEADERSHIPS

**Tau Beta Pi**, FLØ Chapter

Engineering Honor Society

• Advisor, 2021 – Present

• President, 2018 – 2020

**Alpha Eta Mu Beta**

BME Honor Society

• Treasurer, 2020

• Event Planner, 2018 – 2020

**Mechanical FE/EIT** (2013),

**ASME** (2005), **BMES** (2018),

**AHA** (2020)

## **CONFERENCES / AWARDS / FELLOWSHIPS**

**9<sup>th</sup> World Congress of Biomechanics 2022, July 10-14, Taipei, Taiwan** (Oral presentation)

*Abstract:* “Valve Endothelial Cell Secretions Augment Calcification by Valve Interstitial Cells”

**8<sup>th</sup> Heart Valve Society Annual Meeting 2022, March 3-5, Miami Beach, FL, USA** (ePoster presentation)

*Abstract:* “Bio-scaffold Versus Synthetic Scaffold Interactions with Seeded Stem Cells in Dynamic Flow Culture Environments”

**7<sup>th</sup> Heart Valve Society Annual Meeting 2021, April 9, Miami Beach, FL, USA** (Virtual conference, video presentation)

*Abstract:* “Tricuspid versus Mitral Performance of Cylindrical Porcine Small Intestinal Submucosa Valves”

**52<sup>nd</sup> Biomedical Engineering Society Annual Meeting 2020, October 14-17, San Diego, CA, USA**

(Virtual conference, video presentation)

*Abstract:* “Calcific Media Combined with Media from Oscillatory Flow-Conditioned Valve Endothelial Cells Leads to Valve Interstitial Cell Calcification”

AEMB Travel Award

**International Conference of Tissue-Engineered Heart Valves + 6<sup>th</sup> Heart Valve Society Annual Meeting 2020, February 14-16, Abu Dhabi, UAE** (Oral presentation)

*Abstracts:* “Hydrodynamic Assessment of a Small Intestinal Submucosa Tubular Aortic Valve” and

“Hydrodynamic Assessment of a Small Intestinal Submucosa Tubular Mitral Valve”

**51<sup>st</sup> Biomedical Engineering Society Annual Meeting 2019, October 16-19, Philadelphia, PA, USA**

(Poster presentation)

*Abstract:* “Vascular Smooth Muscle Cell Alpha-Smooth Muscle Actin Expression after Exposure to Conditioned Media from Endothelial Cells Cultured in Oscillatory Flow Environments”

AEMB Travel Award

**5<sup>th</sup> Summer Biomechanics, Bioengineering, and Bio-transport Conference 2019, June 25-28, Seven Springs, PA, USA** (Poster presentation)

*Abstract:* “The Effects of Oscillatory Shear Regulation on Paracrine Signaling between Vascular Endothelial Cells and Vascular Smooth Muscle Cells”

**50<sup>th</sup> Biomedical Engineering Society Annual Meeting 2018, October 17-20, Atlanta, GA, USA** (Poster presentation)

*Abstract:* “Assembly of a Pulsatile Flow Bioreactor System to Facilitate Oscillatory-flow Conditions to Optimize *In Vitro* Engineered Valve Tissue Growth”

**Graduate Research Day 2022, March 9, FIU**

*Abstract:* “Valve Endothelial Cells Exposure to High Oscillatory Flow Leads to Valve Interstitial Cell Calcification”

Oral Presentation 1<sup>st</sup> Prize Award

**Graduate Research Day 2021, March 12, FIU**

*Abstract:* “Tricuspid versus Mitral Performance of Cylindrical Porcine Small Intestinal Submucosa Valves”

Poster Presentation 2<sup>nd</sup> Prize Award

**Graduate Research Day 2020, March 6, FIU**

*Abstract:* “Hydrodynamic Assessment of Small Intestinal Submucosa Tubular Valves”

Poster Presentation 2<sup>nd</sup> Prize Award

**Biomedical Research Initiative (BRI) 2018, FIU**

*Project Title:* “Optimal Engineering of Heart Valve Tissues Using Human Bone Marrow Stem Cells”

Summer Research Award funded by NIGMS RISE

**Dissertation Year Fellowship (DYF), FIU**

Spring – Summer 2022

## PUBLICATIONS

Mirza A, **Hsu CPD**, Rodriguez A, Alvarez P, Lou L, Sey M, Agarwal A, Ramaswamy S, Hutcheson JD. Computational Model for Early-Stage Aortic Valve Calcification Shows Hemodynamic Biomarkers. *Bioengineering*. 2024; 11(10): 955. DOI: <https://doi.org/10.3390/bioengineering11100955>

Gonzalez BA, Herrera A, Ponce C, Gonzalez Perez M, **Hsu CPD**, Mirza A, Perez M, Ramaswamy S. Stem Cell-Secreted Allogeneic Elastin-Rich Matrix with Subsequent Decellularization for the Treatment of Critical Valve Diseases in the Young. *Bioengineering*. 2022; 9(10): 587. DOI: <https://doi.org/10.3390/bioengineering9100587>

**Hsu CPD**, Tchir A, Mirza A, Chaparro D, Herrera RE, Hutcheson JD, Ramaswamy, S. Valve Endothelial Cell Exposure to High Levels of Flow Oscillations Exacerbates Valve Interstitial Cell Calcification. *Bioengineering*. 2022; 9(8): 393. DOI: <https://doi.org/10.3390/bioengineering9080393>

Gonzalez BA, Perez-Nevarez M, Mirza A, Perez MG, Lin YM, **Hsu CPD**, et al., Ramaswamy, S. Physiologically Relevant Fluid-Induced Oscillatory Shear Stress Stimulation of Mesenchymal Stem Cells Enhances the Engineered Valve Matrix Phenotype. *Frontiers in Cardiovascular Medicine*. 2020; 7. DOI: <https://doi.org/10.3389/fcvm.2020.00069>

**Hsu CPD**, Hutcheson JD, Ramaswamy S. Oscillatory Fluid-Induced Mechanobiology in Heart Valves with Parallels to the Vasculature, *Vascular Biology*. 2020; 2(1), R59-R71. DOI: <https://doi.org/10.1530/VB-19-0031>

Ruder WC, **Hsu CPD**, Edelman BD, Schwartz R, Leduc PR. Biological colloid engineering: Self-assembly of dipolar ferromagnetic chains in a functionalized biogenic ferrofluid. *Applied Physics Letters*. 2012; 101(6), 063701. DOI: <https://doi.org/10.1063/1.4742329>

Ruder WC, **Hsu CP**, Chou SY, Dawson JT, Gonzalez LM, Antaki JF, Leduc PR. Micropatterning Biomanufactured Single-Domain Nanoparticles using Self-Assembly to form Artificial Magnetosome Chains. *Biophysical Journal*. 2010; 98(3). DOI: <https://doi.org/10.1016/j.bpj.2009.12.4001>