BIOGRAPHICAL SKETCH

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NAME: **Alexandra Polasko**

eRA COMMONS USER NAME (credential, e.g., agency login): **APOLASKO**

POSITION TITLE: Postdoctoral Fellow

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Start Date	Completion Date	FIELD OF STUDY
University of California, Berkeley	B.S.	09/2011	05/2015	Environmental Science
University of California, Los Angeles	M.S.	09/2015	12/2017	Civil Engineering
University of California, Los Angeles	Ph.D.	01/2017	07/2021	Civil & Environmental Engineering
University of California, Los Angeles	Postdoc	07/2021	07/2022	Oral Biology/Microbiology
Stanford University, Palo Alto	Postdoc	09/2022	Current	Urology

A. Personal Statement

I bring a diverse and unique expertise to the field of benign urology, owing to my research experiences in molecular biology, engineering, and human biology; elements that are relevant to benign prostate hyperplasia (BPH). In my proposed research, I plan to leverage this expertise to target BMP5 and synergistic growth factors in BPH using patient-derived xenograft and spheroid models. I have published 8 first author papers with three research experiences that built the foundation for my work in urology with the first two during my doctoral degree and last during a postdoctoral position. In the first half of my Ph.D., I engineered a bacterial consortium to break down carcinogenic groundwater pollutant mixtures and methods for optimizing their use *in situ*. While aiming to remediate pollutants directly related to cancer, I became interested in the interplay between environmental toxins and cancer, ultimately steering my focus toward healthcare and the biological pathways that drive disease. Collaborating with Dr. Richard Kaner in UCLA's Chemistry Department, I developed a hydrophilic coating to reduce microbial adhesion on catheters and other medical surfaces. My knowledge in applied microbiology and engineering was an ideal combination of skills to investigate the surfaces of medical materials exposed to bacterial and fungal infections. Ultimately, we demonstrated the efficacy of this novel coating to reduce biofilm formation on catheters both *in vivo* and *in vitro* and **published our work in the journal, *Advanced Materials* (IF=27)**. I am an **inventor on the patent** for the application of this novel coating, which is now part of the UCLA-affiliated start-up-- SILQ. During the next pre-clinical phase of this research, I had the opportunity to work with the urologist, Dr. Matthew Bui, at Cedars Sinai to develop a unique and published multipronged method for evaluating biofilm formation on catheters in a clinical setting. Through these experiences, I developed a passion for clinically driven urology.

Accelerating my drive to the medical field was the sudden news that my Ph.D. advisor was diagnosed with cancer. Therefore, after graduation, I aimed to further my knowledge of bacteriology and tumor growth and joined Dr. Hung Ton-That's lab at UCLA in the School of Dentistry. As a Postdoc, I researched how the oral microbiome can influence disease states (e.g., urinary tract infections, stillbirth) and colorectal cancer progression. I gained experience working with murine models (e.g., xenografts, pre-term birth, subcutaneous implants), growing human cell lines, scanning electron microscopy, and immunohistochemistry staining methods. These experiences strategically aligned with the benign urological diseases work of Dr. James Brooks and ultimately accelerated my progress in his lab. For example, my work on the characterization of a patient derived xenograft model of BPH was recently **published in the journal, *Laboratory Investigation*** as well as I was awarded **Stanford's K12 Urology Research Career Development** Award. By leveraging my interdisciplinary expertise and motivation for translational urology research, I aim to become an assistant professor that develops innovative therapies and contributes to a deeper understanding of the biological pathways driving BPH.

B. Positions, Scientific Appointments and Honors

Positions

2022 – Present Postdoctoral Fellow, Stanford University
2025 – Present CAIRIBU K12 Seminar Series Moderator
Leadership role: *Seminar series moderator*
2022 – Present Member, American Urological Association; Society for Basic Urologic Research (SBUR)
2021 – 2022 Postdoctoral Fellow, University of California, Los Angeles
2020 – 2021 UCLA Doctoral Student Advisory Committee for Civil Engineering Faculty Search
Leadership role: Committee Chair of Advisory Doctoral Student Committee (2020-2021)
2019 – 2020 Graduate Student Instructor, CEE 200-Teaching Assistant Training Seminar
2017 – 2020 UCLA CARE Science, Engineering, and Math Undergraduate Summer Research Program
Leadership role: Graduate Mentor (2017-2020)
2016 – 2021 Graduate Society of Women Engineers (GradSWE), Member
Leadership roles: Secretary (2017-2018), VP of Undergrad-Graduate Affairs (2018-2019)
2015 – 2021 Graduate Student Researcher, University of California, Los Angeles
2012 – 2015 Undergraduate Research Assistant, University of California, Berkeley

Honors

2024 **Society of Basic Urologic Research** (SBUR) Donald Coffey **Innovation Award** *Finalist*
2024 **Society of Basic Urologic Research** (SBUR) 2024 Conference **Travel Award**
2024 **K12** Multidisciplinary Urologic Research (KURe) **Career Development Award**
2024 American Urological Association **Early Career Investigators Workshop**-*Adv. Stage*
2024 **American Urological Association** Urology Care Foundation Postdoctoral Scholar Award, *declined due to K12 funding conflict*
2024 **Stanford** School of Medicine **Dean's Postdoctoral** Fellowship
American Urological Association **Early Career Investigators Workshop**-*Early Stage*
2023 Collaborating for the Advancement of Interdisciplinary Research in Benign Urology (**CAIRIBU**) Conference, **1st Place** Poster Presentation Award
2022 UCLA Institutional Research and Academic Career Development Award (IRACDA) Postdoctoral Fellow Recipient (3-Year Award)
2022 UCLA School of Dentistry Research Day Oral Presentation Competition, **1st Place**
2021 UCLA Dentist-Scientist and Oral Health-Researcher T90 NIH Training Fellowship
2021 **UCLA Distinguished Teaching Award** for Teaching Assistants
1st female engineering graduate student to receive in UCLA history
2015–2020 University of California Eugene V. Cota Robles 4-Year Graduate Fellowship
2019, 2020 SILQ Industry-Sponsored Research Fellowship
2019 UCLA Center for Advancement of Teaching Classroom Mini-Grant Award
2019 American Water Works Association Drinking Water Fellowship
2018 Emerging Contaminants Conference Poster Presentation Award, **1st Place**
2017 UCLA Distinguished **Master's Thesis Award-*Engineering***
2017 UCLA Campus Wide Research Pitch Competition (GradSlam), 3rd Place
2016 Brown and Caldwell Women in Leadership Fellowship
2016 **New England Biolabs** National Passion in Science Award-*Environmental Stewardship*
2016 National Science Foundation Graduate Research Fellowship, Honorable Mention
2015 Malcolm R. Stacey Research Fellowship
2015 Charlene Conrad Liebau Prize for Undergraduate Research, Honorable Mention
2015 Len Assante National Groundwater Research Fellowship

Patents

1. Brian T. McVerry, Ethan Rao, Richard B. Kaner, Na He, and **Alexandra L. Polasko,** and Yi-Wei Chen**.** Methods of Reducing Foreign Body Response Encrustation of Devices. The Regents of the University of California, Silq Technologies Corporation. Application Serial No. 50117-711.101, Published on February 22, 2024.
2. Shaily Mahendra and **Alexandra L. Polasko**. Anaerobic-Aerobic Bioremediation of Contaminated Water. Application Serial No. 62/590,030, Published on November 26, 2020

3. Richard B. Kaner, Dayong Chen, Brian T. McVerry, Ethan Rao, and **Alexandra L. Polasko**. The Regents of the University of California, Hydrophilix. Biofouling Resistant Coatings and Methods of Making and Using The Same. United States patent US 10,729822. 2020 Aug 4.

C. Contributions to Science

1. **[Postdoc Career, 2022-Present] Establishment and characterization of a patient-derived xenograft model of human benign prostatic hyperplasia:** To address the need for animal models that maintain stromal–epithelial cell interactions and elucidate mechanisms driving BPH, I have established and characterized a patient-derived xenograft (PDX) murine model that aptly mirrors the hyperplastic growth found in affected aging men. Fresh human BPH transition zone or normal peripheral zone prostate tissue was implanted under the renal capsule of immunocompromised mice and explanted after 1 week, 1 month, 2 months, or 3 months. The model exhibited striking growth differences between normal and BPH tissues. The BPH PDXs displayed significant changes in weight, cellular proliferation, apoptosis, and serum prostate-specific antigen (PSA) levels. Molecular profiling revealed specific gene and protein expression patterns correlating with BPH pathophysiology. Notably, the PDX model maintains key features of human tissue, such as PSA secretion and responsiveness to finasteride treatment, making it invaluable for studying BPH pathogenesis and identifying potential therapeutic interventions.
    a. **Polasko, A.** Zhang, D., Ramraj, A., Chiu, C. L., Garcia-Marques, F. J., Bermudez, A., Kapp, K., Peterson, E., Qiu, Z., Pollack, A. S., Zhao, H., Pollack, J. R. *[Co-Mentor],* Pitteri S. J. *[Collaborator]*, and J. D. Brooks *[Primary Mentor]*. Establishing and Characterizing the Molecular Profiles, Cellular Features, and Clinical Utility of a Patient-Derived Xenograft Model Using Benign Prostatic Tissues. *Lab. Invest.*, 2024, 104, PMID: 39222914
    b. **Polasko, A.,** Ramraj, A., Zhang, D., Chiu, J., Qiu, P., Peterson, E., Garcia-Marques, F.J., Bermeduz, A., Kathryn K., Pitteri, S. *[Collaborator]*, Pollack, J. *[Co-Mentor]*, Pollack, A., Zhao, H., and J.D. Brooks *[Primary Mentor]*. Establishment, characterization, and pre-clinical testing of a patient-derived xenograft model of human BPH. SBUR, Nov., 2024. **Donald S. Coffey Innovation Award Finalist*
    c. Garcia-Marques, F.J., Zakrasek, E., Bermeduz, A., **Polasko, A.,** Liu, S., Stoyanova, T., Brooks, J.D. *[Primary Mentor]*, Lavelle, J., and Pitteri, S. *[Collaborator]*. Proteomics analysis of urine and catheter-associated biofilms in spinal cord injury patients. Am. *J. Clin. Urol.,* 2023, 15;11(3):206-219. PMID: 37441441.
    d. **Polasko, A.,** Zhang, D., Chiu, J., Qiu, P., Peterson, E., Ramraj, A., Zhao, H., and J.D. Brooks *[Primary Mentor]*. Establishment and characterization of a patient-derived xenograft model of human benign prostatic hyperplasia. CAIRIBU, Nov., 2023. **1st place poster presentation*

2. **[Postdoc Career, 2021-2022] Characterized the oral pathogen, *Fusobacterium nucleatum's*, motility as a virulence factor:** I elucidated the oral pathogen, *Fusobacterium nucleatum's*, ability to be motile as well as critical factors that contribute to its motility. *F. nucleatum*, an oncobacterium, and colonizer of oral biofilms is classified as non-motile without validation. However, I visualized and quantified single cell and colony movement in three independent *F. nucleatum* strains on a macro and micro-scale in real-time using computational image analyses. Additionally, using a transposon (Tn5) *F. nucleatum* mutant library, I discovered that lipopolysaccharides, a known endotoxin and virulence factor, aids *F. nucleatum* motility. Specifically, truncation of the outer most portion of the LPS structure (i.e. O-antigen) leads to reduced viability as well as virulence as demonstrated in a murine pre-term birth model of infection. The results from this work determined that LPS biogenesis is critical for *F. nucleatum* motility, bacterial colonization, and virulence.
    a. **Polasko, A.,** Chen, Y. Chen, Y-W., and Ton-That, H. Oral pathogen on the move: Characterizing *Fusobacterium nucleatum's* motility. UCLA School of Dentistry Research Day, Mar. 2022.
    2022 UCLA School of Dentistry Research Day Oral Presentation. 1st place

3. **[Graduate Career, 2015-2021] Treated contaminated water using engineered bacterial cultures and developed a novel antibiofouling coating for medical devices:** My graduate research investigated microbial interactions with water contaminants and surfaces with applications ranging from bioremediation to biofouling prevention. With a focus on the duality of the microbial world, my first doctoral project successfully constructed an unconventional microbial community comprised of

anaerobic (*Dehalococcoides mccartyi* 195) and aerobic bacteria (*Pseudonocardia dioxanivorans* CB1190) to remove chlorinated solvent mixtures over varying redox conditions. This microbial culture was deployed to a field site located in Pennsylvania *in situ* and successfully removed these recalcitrant pollutants from groundwater over 9 months. Additionally, I discovered CB1190's ability to biodegrade the known carcinogen and water pollutant, vinyl chloride (VC) to benign end products. Using metabolomics of ^{13}C-labeled VC, I confirmed VC incorporation by CB1190 and tracked the production of isotopically labeled amino acids, keto acids, and sugar phosphate molecules to construct a degradation pathway. In my second doctoral project, I collaborated with Dr. Richard Kaner in the Chemistry Department at UCLA to construct a novel superhydrophilic, zwitterionic-based coating to reduce microbial attachment to medical surfaces. After demonstrating the material's ability to reduce bacterial and fungal adhesion on silicone, we demonstrated the application of this material on Foley catheters. From there, I worked with the urologist, Dr. Matthew Bui, at Cedars Sinai Hospital, to develop a multipronged assay for biofilm detection on catheters. We then tested the performance of our catheters compared to traditional latex and silicone catheters in patients as well as the foreign body reaction in mice, both of which showed reduction in microbial and collagen adhesion.

a. *McVerry, B., ***Polasko, A. [co-first author],** *Rao, E., Haghniaz, R., Chen, D., He, N., Ramos, P., Hayahsi, J., Curson, P., Wu, C.-Y., BAndaru, P., Anderson, M., Bui, B., Sayegh, A., Mahendra, S., Carlo, D. D., Kreydin, E., Khademhosseini, A., Sheikhi, A., Kaner, R. B., A readily scalable, clinically demonstrated, antibiofouling zwitterionic surface treatment for implantable medical devices. *Adv. Mater.* 2022, 34, 2200254. ***authors contributed equally to this work**
b. ***Polasko, A.**, *Miao, Y., Kwok, K., Park., K., Park, J. O., and Mahendra, S. Vinyl chloride and 1,4-dioxane metabolism by *Pseudonocardia dioxanivorans* CB1190. *J. Haz Mat. Lett*., 2021, 2:100039. ***authors contributed equally to this work.**
c. ***Polasko, A.,** *Ramos, P., Kaner, R. B., and S. Mahendra. A multipronged approach for accurate *in vitro* quantification of catheter-associated biofilms. *J. Haz. Mat. Lett.,* 2021, 2:10032. ***authors contributed equally to this work**
d. **Polasko, A.,** A. Zulli, P. Gedalanga, P. Pornwongthong, and S. Mahendra. A mixed microbial community for the biodegradation of chlorinated ethenes and 1,4-dioxane. *Environ. Sci. & Technol. Lett.,* 2019, 6: 49-54.

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Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/alexandra.polasko.1/bibliography/public/

D. Additional Information: Scholastic Performance

Peer Review for Journals: *Current Microbiology*, *International Journal of Biological Macromolecules*, *Journal of Hazardous Materials*, *Water Research*, *Environmental Science & Technology*, *Cancers*

Research Mentorship

- Mentored and designed research projects for 4 Master's, 11 undergraduate, 4 high school students.
- 90% undergraduate researcher assistants from underrepresented/underserved communities
- 2 undergraduate students mentored through **Stanford Canary Cancer Research** Summer Program
- 1 undergraduate student recruited and mentored through **Stanford's Pre-Renal Initiative Program**
- 3 undergraduate students received **UCLA's Dean Undergraduate Research Award**
- Mentored 2 Masters students and 1 undergraduate from California State Universities
- 3 students received UCLA CARE Science, Engineering, and Math Summer Research Fellowship
- 3 students presented at **Annual Biomedical Research Conference for Minoritized Scientists** (ABRCMS) & won 1st Place in Poster Competition (*Biology & Microbiology Division*)
- 1 student from UC Davis Summer Program for Undergraduate Research (SPUR)

Teaching Experience and Community Outreach

***Guest Lecturer* (Research-Focused):** Fate & Transport of Organic Chemicals (UCLA, Fall 2017, Fall 2018), Environmental Biotechnology (UCLA, Winter 2018), Microbial Remediation (Pepperdine, Fall 2020, Summer 2021), Environmental Microbiology (UCLA, Winter 2021), Microbial Remediation (Antelope Valley Community

College, Spring 2021), Fungal and Parasitic Infections (UCLA-School of Dentistry, Winter 2022), Immunological Techniques in the Laboratory (San Jose State University, Fall 2023, 2024), The Role of BPH in Aging (UCLA, Spring 2024)

Graduate Student Instructor

1. Graduate Teaching Seminar (Fall 2019): Instructed 30 engineering students weekly on techniques for communicating engineering principles, concepts, and methods to undergraduate students.
2. Graduate Teaching Seminar-*Online* (Fall 2020): Built and instructed a 10-week course for 16 engineering students on how to effectively teach online. Course introduced incoming doctoral students to the existing and new responsibilities required of online teaching assistants and resources for equitable/inclusive teaching.

Teaching Assistant

3. Introduction to Environmental Engineering (Fall 2016): Led weekly discussion sections with 20-40 students on the environmental engineering problems and solutions. Helped students solve homework problems and develop an understanding of environmental chemistry and biology.
4. Water and Wastewater Treatment (Winter 2017): Led weekly 2-hour discussion section with 15 students on fundamentals of water and wastewater treatment processes. Live and recorded demonstrations were used to illustrate biological and chemical water treatment methods.
5. Environ. Biotechnology-*Online* (Spring 2019): Led weekly online classes on biological processes in natural and engineered environments. Developed course content, online interactions, and grading.