

HALUK BEYENAL, PhD

Professor

The Gene and Linda Voiland School of Chemical Engineering and Bioengineering, Washington State University, PO Box 642710, Pullman, WA 99164-2710. Telephone: (509) 335-6607, Fax: (509) 335-4806,

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<https://publons.com/researcher/2788607/haluk-beyenal/>, Web of Science ResearcherID:E-4413-2011

Professional experience

- 2015- Professor, The Gene and Linda Voiland School of Chemical Engineering and Bioengineering, Washington State University
- 2010-2015 Associate Professor, The Gene and Linda Voiland School of Chemical Engineering and Bioengineering, Washington State University
- 2006-2010 Assistant Professor, The Gene and Linda Voiland School of Chemical Engineering and Bioengineering, Washington State University
- 2002-2006 Research Assistant Professor, Center for Biofilm Engineering, Montana State University
- 1997-2001 Postdoctoral Researcher, Center for Biofilm Engineering, Montana State University
- 1996-1997 Research Fellow, Center for Biofilm Engineering, Montana State University
- 1991-1996 Research and Teaching Assistant, Chemical Engineering Department, Hacettepe University, Turkey

Education

- 1996-1997 Visiting PhD Student, Center for Biofilm Engineering, Montana State University
- 1993-1997 PhD in Chemical Engineering, Hacettepe University, Ankara, Turkey
- 1990-1993 MS in Chemical Engineering, Hacettepe University, Ankara, Turkey
- 1985-1990 BS in Chemical Engineering, Hacettepe University, Ankara, Turkey (with honors)

Research areas

- Biofilms (biofilm electrochemistry, electrochemically active biofilms, electrochemical biofilm control, and microsensors to quantify biofilm processes)
- Electrochemistry
- Environmental microbiology

Major accomplishments

- Received NSF-CAREER award
- Received 3M non-tenured faculty award
- Invented electrochemical scaffold and discovered mechanism of action for electrochemical biofilm control
- Developed novel electrochemical techniques to study electrochemically active biofilms
- Discovered applications of electrochemically active biofilms
- Published a book on fundamentals of biofilm research (1st and 2nd editions)
- Published an edited book on electrochemically active biofilms
- Developed new electrochemical and optical microsensors
- Discovered new treatment strategies for wound biofilms
- Designed microbial fuel cells and developed technologies for using electricity from microbial fuel cells
- Developed image analysis software for biofilm structure quantification
- Organized workshops to teach biofilm processes

Awards and honors

- 2018 Outstanding Research Faculty Award, Voiland College of Engineering and Architecture, Washington State University
- 2018 Anjan Bose Outstanding Researcher Award, Voiland College of Engineering and Architecture, Washington State University
- 2017 Outstanding Research Faculty Member in the Voiland School of Chemical Engineering and Bioengineering, Washington State University
- 2017 Tech Connect Defense Medical Innovation Award
- 2014 Outstanding Academic Advisor, Washington State University, Graduate and Professional Student Association
- 2013 Senior fellow for the summer faculty research program, Office of Naval Research
- 2012 Co-Founder: ISMET (International Society of Microbial Electrochemical Technology)
- 2011 Outstanding Researcher Award, College of Architecture, Washington State University
- 2010 NSF-CAREER Award
- 2007 3M Non-tenured Faculty Award
- 2005 Outstanding Researcher Award, College of Engineering, Montana State University
- 1996 Doctoral research fellowship for studying abroad, awarded by The Scientific and Technical Research Council of Turkey
- 1994-1996 Doctoral research fellowship, awarded by The Scientific and Technical Research Council of Turkey

Teaching experience and classes taught

- Instructor, ChE 597 Research Methods (2018)
- Instructor, ChE 462 Applied Electrochemistry (2017,2020)
- Co-Instructor, ChE 597 Protein Biotechnology (2016, 2019)
- Instructor, ChE 510 Transport Phenomena (2015, 2016, 2021)
- Instructor, ChE 598/498 Electrochemical Engineering (2015, 2017)
- Instructor, ChE 597 Research Methods (2018)
- Instructor, ChE 596 Research Methods (2014)
- Instructor, ChE 581 Biofilms (2009, 2011, 2013, 2014, 2020)
- Instructor, ChE 481 Biofilms (2014)
- Instructor, ChE 529 Chemical Engineering Kinetics (2011)
- Instructor, ChE 465 Envirochemical Engineering (2009, 2010, 2020)
- Instructor, ChE 398 and 498 Chemical Engineering Technical Seminars (2009, 2010)
- Instructor, ChE 560 Advanced Biochemical Engineering (2/3 teaching load, 2009)
- Instructor, ChE 433 Unit Operations Laboratory (2008)
- Instructor, ChE 560 Advanced Biochemical Engineering (2007)
- Instructor, ChE 475 Bioprocess Engineering (2006, 2007, 2010, 2011, 2012, 2013, 2018)
- Instructor and Co-organizer, short course: Electrochemically Active Biofilms (2018, 2019)
- Instructor and Co-organizer, Biofilms Summer School / workshops on microsensors and image analysis (2001-2009, 2014-2017)

Current graduate students and postdoctoral fellow

- Mohammed Abdul, postdoctoral research associate
- Gretchen M. Tibbits, PhD student (expected graduation date: Spring 2022)
- Duygu Aydin, PhD student (expected graduation date: Spring 2025)
- Monzural Anoy, PhD student (expected graduation date: Fall 2022)

Dilara Ozdemir, PhD student (expected graduation date: Spring 2024)

Tyler Danby, MS student (expected graduation date: Spring 2024)

Previous graduate students and postdoctoral fellows (18 PhD, 7 MS and 5 postdoctoral research associates)

Mohammed Abdul, postdoctoral research associate (September 2019 – cont.)

Banafsheh Molki, PhD student (graduated Fall 2019, employed by Washington State University)

Mohammed Abdul, PhD student (graduated Summer 2019, employed by Washington State University)

Phuc Ha, postdoctoral research associate (June 2013 – June 2019), employed by Washington State University

Adan S. Medina, PhD student (graduated Summer 2019, employed by Pacific Northwest National Laboratory)

Secil Tutar, PhD student (graduated Fall 2018, employed by Selcuk University)

Sandra Milena Rincon Miranda, PhD student (graduated Summer 2018)

Ahmed Ben Sahil, MS student (graduated Spring 2018, employed by UTSA)

Mia Mae, PhD student (graduated Spring 2018, employed by DoD)

Emily Davenport, PhD student (graduated Spring 2016, employed by Illumina)

Erhan Atci, PhD student (graduated Spring 2016, employed by Intel)

Sujala Sultana, PhD student (graduated Spring 2016, employed by Intel)

Timothy Harrington, PhD student (graduated Spring 2015, employed by Illumina)

Timothy Ewing, PhD student (graduated Spring 2014, employed by Washington State University as an Instructional Laboratory Manager)

Tanzil Abid Hossain, MS student (graduated Fall 2014, employed by Washington State University as a PhD student)

Jerome Babauta, postdoctoral research associate (October 2012 – October 2015), employed by the Space and Naval Warfare Systems Command (SPAWAR), San Diego

Taimur Khan, postdoctoral research associate (October 2012 – September 2013), employed by Washington State University as a Clinical Assistant Professor

Ryan Renslow, PhD student (graduated Fall 2012, employed by Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, Richland, Washington 99352)

Jerome Babauta, PhD student (graduated Fall 2012, employed by Gamry)

Ozlem Istanbulu, PhD student (graduated Fall 2012, currently employed by Hitit University as an Assistant Professor)

Conrad Donovan, PhD student (graduated Fall 2012, started his own business)

Hung Duc Nguyen, PhD student (graduated Summer 2012, employed by Diana Jsc., a member of Unicharm Japan, Supply Chains & Activities Controller to Supply Chains Manager in Vietnam)

Bulbul Ahmed, PhD student (graduated Fall 2012, employed by In-Pipe Technology, IL)

Alim Dewan, PhD student (graduated Spring 2010, employed by Miami University as a Lecturer)

Srilekha Nannapaneni, MS (Fall 2011)

Brian P. Esparza, MS (graduated Summer 2010, employed by CH2M)

Bin Cao, postdoctoral research associate (May 2009 – October 2011, currently an Associate Professor in Nanyang Technological University, Singapore)

Ryan Scott Renslow, MS (graduated Fall 2009, employed by Washington State University as a PhD student)

Conrad Donovan, MS (graduated Fall 2009, co-advised with Dr. Heo of Electrical Engineering)

Hung Duc Nguyen, MS (graduated Summer 2008, employed by Washington State University as a PhD student)

Visiting scholars (PhD students, postdocs, sabbaticals)

Jintae Lee, Professor from School of Chemical Engineering, Yeungnam University, Korea (September 2019 – August 2020)

Hoda Kabary, PhD, visiting scholar from Department of Agricultural Microbiology, Division of Biological and Agriculture Research, National Research Centre, Dokki, Egypt (October 2019 – April 2020)

Jung Rae Kim, Associate Professor from the School of Chemical and Biomolecular Engineering, Pusan National University (PNU), Korea (September 2018 – August 2019)

Maryam Tarkashvand, visiting PhD student from University of Tehran, Iran (November 2017 – October 2018)

Rajesh Sani, Associate Professor from the South Dakota School of Mines (January – August 2018)

Panpan Liu, visiting PhD student from Tsinghua University, China (January – October 2018)

Fernanda Menezes, visiting PhD student (October 2017 – June 2018)

Fei Guo, visiting PhD student (April 2014 – March 2016)

Marselo Aybar, visiting PhD student (February 2014)

Beril Gul, visiting student (May 2013 – September 2013)

Antonio Rodríguez, Assistant Professor, Department of Enzymology and Chemical Engineering, Mexico (joined my group for one month, 2013)

Qaiser F. Khan, visiting PhD student (October 2012 – May 2014)

Alex Rosenthal, visiting PhD student, New York City University (April 2012 and February 2014).

Vildan Caner, Associate Professor, Pamukkale University, Turkey (joined my group for 2 months, 2012)

Tuba Ica, Assistant Professor of Microbiology, Dumlupinar University, Turkey (joined my group for six months, 2010)

Jesús Rodríguez Martínez, Professor and Chair, Department of Enzymology and Chemical Engineering, Mexico (joined my group for eight months during his sabbatical, 2009)

Raice Ahmed, visiting PhD student, Microbiology (joined my group for seven months, 2009)

Undergraduate students involved in research in my group (‘ first author manuscript, * paid, + this student joined a PhD program either at WSU or at another institute)

Christi Webster*, Maria Pham*, Ryan Zimmisky*, Chloe R Strupulis⁺*, Maria Predtechenskaya*, Suzanne N. Gelston*, Zeynep B. Ay*, Maxwell McDaniel*, Julian Gerald Silva*, Lars Neuenschwander*, Hannah Zmuda^{’*} (published a research paper as a co-author), Youjin Kim, Christi Webster*, Maddie Newberry*, Marisol Contreras^{*,+}, Gretchen M. Tibbits^{*,+}, Mia Kiamco^{*,+} (published a research paper as a co-author), Vi Tran* (published a research paper as a co-author), Adan Medina^{*,+}, Mohammed Abdul^{*,+} (published two research papers as a co-author), Zea Kiamco, Kayee Koe Wong⁺, Moataz Reda^{*,+}, Xiaoxue Hou^{*,+}, Jessica Boyce*, Sarah Turner*, Sarah Sneesby*, David Tobin*, Matthew Shim* (published a research paper as a co-author), Kent Walker*, Michael Jonn*, Amanda Bates*, Ryan Renslow^{*,+}, Aaron Sinclair, Harvey Rojas Mora*, Wajma Arif*, Robert Tai, Sam Jochen, and Fabiola Quiroa.

Graduate committees on which I served (excluding my own PhD and MS students)

Fuad Ale Enriquez, Chemical Engineering, Washington State University. Continue-.

Alisan Ahmed, Civil and Environmental Engineering, Washington State University. Continue-.

Solange Elizabeth Astorga, PhD committee, Nanyang Technological University, School of Materials Science and Engineering, Singapore. External examiner. *In process.*

Samuel Uzoechi, PhD committee, Chemical Engineering, Washington State University. Graduated in 2018.

Somayeh Ramezani, PhD committee, Chemical Engineering, Washington State University. Graduated in 2018.

Fu Xiao, PhD committee, Biological Systems Engineering, Washington State University. Graduated in 2018.

Larissa Gribat, MS committee, Chemistry, Washington State University. Graduated in 2017.

Azeza Falghoush, PhD committee, College of Veterinary Medicine, Washington State University. Graduated in 2017.

Baran Arslan, PhD committee, Chemical Engineering, Washington State University.

Zachary Joseph Speth, MS committee, Chemical Engineering, Washington State University. Graduated in 2016.

Buntu Godongwana, PhD committee, Chemical Engineering, Cape Peninsula, University of Technology, South Africa. External examiner. Graduated in 2016.

George Papacharalampos, PhD committee, Faculty of Environment and Technology, University of the West of England, Bristol. External examiner. Graduated in 2015.

Wang Bochuan Victor, PhD committee, Nanyang Technological University, School of Materials Science and Engineering, Singapore. External examiner. Graduated in 2016.

Pinar Gordasli, PhD committee, Chemical Engineering, Washington State University. Graduated in 2013.

Asma Eskan, Chemical Engineering, Washington State University. Graduated in 2013.

Marshall Sheerene Sheldon, PhD committee, Chemical Engineering, Cape Peninsula University of Technology, South Africa. External examiner. Graduated in 2009.

Bong-Je Park, PhD committee, Chemical Engineering, PhD committee Washington State University. Graduated in 2010.

Reuven Miropolskiy, MS. committee, Chemical Engineering, Washington State University. Graduated in 2009.

Reviewer

Editorial board member (handling manuscripts): *Scientific Reports* (Nature group publication) (2016-)

Associate editor: *Frontiers – Microbiotechnology, Ecotoxicology and Bioremediation* (2016-)

Editorial board member: *Biofouling* (2009-)

Ad hoc: Science, Nature journals, Energy and Environmental Science, Biotechnology and Bioengineering, Environmental Science and Technology, Applied Environmental Microbiology, ChemElectroChem, Water Research, Sensors and Actuators B, Nature Scientific Reports, Chemical Engineering Science, Journal of Electroanalytical Chemistry, Bioelectrochemistry, Biochemical Engineering Journal, Journal of Membrane Science, Journal of Biotechnology, Biotechnology Progress, Biosystems, Journal of Hazardous Materials, Microbial Ecology, Environmental Toxicology and Chemistry, Reviews in Environmental Science and Bio/technology, Water, Air & Soil Pollution, JoVE, Environmental Microbiology, Frontiers in Microbiology, Lab on a Chip, Czech Science Foundation, National Science Foundation, Department of Energy, Department of Defense, Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET), JCATI, DARPA, and the Air Force

Service on committees and task forces

- Graduate Program Committee, The Gene and Linda Voiland School of Chemical Engineering and Bioengineering (2011-)
- Washington State University Research, Arts and Science Committee (2014-2017)
- Washington State University Research Misconduct Committee
- Many National Science Foundation, Department of Energy, Department of Defense, JCATI, DARPA, and Air Force review panels

Patents

- Electrochemical reduction or prevention of infections: US 2018 / 0207301 A1, July 26, 2018. EP3322451A4.
<https://patentimages.storage.googleapis.com/89/43/05/10643ada707cd4/US20180207301A1.pdf>

- Host-free ‘*Candidatus Liberibacter asiaticus*’ culture: International publication number: WO2020/102537 A1.

Conference and symposium contributions

1. Microbial, Enzymatic & Bio-Photovoltaic Electrochemical Reactors Symposium, 2012, Lucerne Switzerland, Scientific Advisory Board
2. “Biofilms 10 Ecology Meets Technology,” 2022, Leipzig, Germany, Scientific Committee
3. “Bioremediation and biodegradation: lab and field applications,” SIMB Annual Meeting, 2019, Washington DC, Session Organizer
4. IWA Biofilm Conference, 2019, Santiago de Chile, Scientific Committee
5. “Electroactive biomaterials to sense and control microbial infections,” AIChE 2018 Annual Meeting, Detroit, MI, USA, Session Chair
6. ACS 2018 Annual Meeting, Boston, MA, Division of Environmental Chemistry Symposium Organizer
7. US–China Collaborative Research on Microbe–Mineral Interaction: Microbial Extracellular Electron Transfer with Minerals as Electron Sources and Sinks Workshop, 2015, PKU, Beijing, China, Organizer
8. “Electrochemically active biofilms and enzymes for biofuels and bioproducts,” ACS 2011 Annual Meeting, Anaheim, CA, Session Organizer
9. IWA Biofilm Structure and Activity Conference, 2004, Las Vegas, NV, Organizing Committee
10. “Bio-based fuels and chemicals,” AIChE 2008 Annual Meeting, Philadelphia, PA, Session Chair

PUBLICATIONS (<https://scholar.google.com/citations?user=IOXztD8AAAAJ&hl=en>, h-index = 56 as of January 6, 2022)

Books

1. Beyenal, H. and Babauta, H. 2015. Electrochemically active biofilms in microbial fuel cells and bioelectrochemical systems: from laboratory practice to data interpretation. *Biofilms in Bioelectrochemical Systems*. Wiley and Sons. Edited book. ISBN: 978-1-118-41349-4, <https://archive.org/details/3P9PJH75>
2. Lewandowski, Z. and Beyenal, H. 2013. Fundamentals of Biofilm Research. 2nd edition, CRC Press. ISBN 9781466559592
3. Lewandowski, Z. and Beyenal, H. 2007. Fundamentals of Biofilm Research. CRC Press. ISBN 9780849335419

Edited specific issues

1. Microbial fuel cell/Bioelectrochemical systems. *Bioresource Technology*, 2021, March, Edited by Chang, I-S., Pant, D., Mohan, V., Beyenal, H.
2. Biofilm Structure and Activity. *Water Science and Technology*, 2005, Volume 52, Issue 7, Selected Papers from Biofilms 2004: Biofilm Structure and Activity Conference, Editors: Lewandowski, Z. and Beyenal, H.

Peer-reviewed journal articles

1. Tibbits, G., Mohamed, A., Call, D.R., Beyenal, H., 2022. Rapid differentiation of antibiotic-susceptible and -resistant bacteria through mediated extracellular electron transfer. *Biosensors and Bioelectronics*, 197, 1, 113754, <https://doi.org/10.1016/j.bios.2021.113754>

2. Cano, E.J., Flurin L., Mohamed, A., Greenwood-Quaintance, K. E., Raval, Y. S., Beyenal, H., Patel, R. 2021. Hypochlorous acid-generating electrochemical catheter prototype for prevention of intraluminal infection. *Microbiol Spectrum*, 9(2), e0055721. <https://doi.org/10.1128/Spectrum.00557-21>
3. Eun Song, Y. E., Mohamed, A., Kim, C., Kim, M., Li, S., Sundstrom, E., Beyenal, H., Jung Rae Kim, J.R., 2022. Biofilm matrix and artificial mediator for efficient electron transport in CO₂ microbial electrosynthesis. *Chemical Engineering Journal*, 427, 131885, <https://doi.org/10.1016/j.cej.2021.131885>
4. Mohamed, A., Ha, P. T., Beyenal, H. 2021. Kinetics and scale up of oxygen reducing cathodic biofilms. *Biofilm*, 3, 100053, <https://doi.org/10.1016/j.biofilm.2021.100053>
5. Raval, Y. S., Mohamed, A., Flurin L., Mandrekar, J.N., Greenwood-Quaintance, K. E., Beyenal, H., Patel, R. 2021. Hydrogen-peroxide generating electrochemical bandage is active *in vitro* against mono- and dual-species biofilms. *Biofilm*, 3, 100055, <https://doi.org/10.1016/j.biofilm.2021.100055>
6. Raval, Y. S., Mohamed, A., Flurin L., Mandrekar, J.N., Greenwood-Quaintance, K. E., Beyenal, H., Patel, R. 2021. In Vitro Anti-Biofilm Activity of Hydrogen-Peroxide Generating Electrochemical Bandage Against Yeast Biofilms. *Antimicrob Agents Chemother*, <https://doi.org/10.1128/AAC.01792-21>
7. Tibbits, G., Wall, N.A., Saunders, S., Babauta, J., Beyenal, H., 2021. Electrochemical detection of flavin mononucleotide using mineral-filmed microelectrodes. *Journal of Electroanalytical Chemistry*, 892, 115307, <https://doi.org/10.1016/j.jelechem.2021.115307>
8. Molina, D.E., Wall, N., Beyenal, H., Ivory, C.F., Flow injection electrochemical quartz crystal microbalance with ICP-OES detection: Recovery of silver by electrodeposition with redox replacement in a flow cell. *Journal of Electrochemical Society*, 168, 056518, <https://doi.org/10.1149/1945-7111/abfcdd>
9. Mohamed, A., Sanchez, E., Sanchez, N., Friesen, M.L., Beyenal, H. Electrochemically active biofilms as an indicator of soil health. *Journal of Electrochemical Society*, 168, 087511, <https://doi.org/10.1149/1945-7111/ac1e56>
10. Shariq, A. F., Beyenal, H., Akin, I. D. 2021. Biofilm addition improves sand strength over a wide range of saturations. *Biofilm*, 3, 100050, <https://doi.org/10.1016/j.biofilm.2021.100050>
11. Mohamed, A., Anoy, M. M. I., Raval, Y. S., Flurin L., Greenwood-Quaintance, K. E., Patel, R., Beyenal, H. 2021. Antimicrobial activity of a hydrogen peroxide-producing electrochemical bandage controlled by a wearable potentiostat in an *in vitro* membrane biofilm model. *Biotechnology and Bioengineering*, 118, 2815–2821, <https://doi.org/10.1002/bit.27794>
12. Mohamed, A., Zmuda, H. M., Ha, P. T., Coats, E. R. and Beyenal, H. 2021. Large-scale switchable potentiostatic/microbial fuel cell bioelectrochemical wastewater treatment system, *Bioelectrochemistry*, 138, <https://doi.org/10.1016/j.bioelechem.2020.107724>
13. Raval, Y. S., Flurin L., Mohamed, A., Greenwood-Quaintance, K. E., Beyenal, H., Patel, R. 2021. *In vitro* antibacterial activity of hydrogen peroxide and hypochlorous acid, including that generated by electrochemical scaffolds. *Antimicrobial Agents and Chemotherapy*, Feb, 65 (5) e01966-20; <https://doi.org/10.1128/AAC.01966-20>
14. Flurin L., Raval, Y. S., Mohamed, A., Greenwood-Quaintance, K. E., Cano, E. J., Beyenal, H., Patel, R. 2021. An integrated HOCl-producing e-scaffold is active against monomicrobial and polymicrobial biofilms. *Antimicrobial Agents and Chemotherapy*, Feb, 65 (3) e02007-20; <https://doi.org/10.1128/AAC.02007-20>
15. Beyenal, H., Chang, I. S., Mohan, S. V., Pant, D. 2021. Microbial fuel cells: Current trends and emerging applications. *Bioresource Technology*, 324, 3, <https://doi.org/10.1016/j.biortech.2021.124687>.
16. Oksuz, S.T., Beyenal, H. 2021 Enhanced bioelectrochemical nitrogen removal in flow through electrodes. *Sustainable Energy Technologies and Assessments*, 47, 101507, <https://doi.org/10.1016/j.seta.2021.101507>
17. Guo, F., Babauta, J.T. and Beyenal, H. 2021. The effect of additional salinity on performance of a phosphate buffer saline buffered three-electrode bioelectrochemical system inoculated with wastewater. *Bioresource Technology*, 320, 124291, <https://doi.org/10.1016/j.biortech.2020.124291>

18. Molki, B., Call, R.D., Ha, P.T., Omsland, A. Gang, D.R., Lindemann, S.R., Killiny, A. and Beyenal, H. 2020. Growth of “*Candidatus Liberibacter asiaticus*” in a host-free microbial culture is associated with microbial community composition. *Enzyme and Microbial Technology*, 142, 109691, <https://doi.org/10.1016/j.enzmictec.2020.109691>
19. Karahan, H. E., Ji, M., Pinilla, J.L., Han, X., Mohamed, A., Wang, L., Wang, Y., Zhai, S., Montoya, A., Beyenal, H., and Chen, Y. 2020. Biomass-derived nanocarbons for biological applications: challenges and prospects.” *Journal of Materials Chemistry B*. <https://doi.org/10.1039/D0TB01027H>
20. Kumar, P., Lee, J-H., Beyenal, H., Lee, J. 2020. Review: Fatty acids as antibiofilm and antivirulence agents. *Trends in microbiology*, <https://doi.org/10.1016/j.tim.2020.03.014>
21. Ben-Sahil, A., Mohamed, A., Beyenal, H. 2020. Three-dimensional biofilm image reconstruction for assessing structural parameters. *Biotechnology and Bioengineering*, 117, 2460-2468, <https://doi.org/10.1002/bit.27363>
22. Medina, S. A., Tibbitts, G., Wall, N.A., Ivory, C.F., Clark, S.B. and Beyenal, H. 2020. Electrochemical pre-concentration of neptunium with a microelectrochemical quartz crystal microbalance. *The Journal of Radioanalytical and Nuclear Chemistry*, 324, 1021–1030, <https://doi.org/10.1007/s10967-020-07138-0>
23. Zmuda, H.M., Mohamed, A., Raval, Y.S., Patel, R., Call, D.R., Schuetz, A.N. and Beyenal, H. 2020. Hypochlorous acid-generating electrochemical scaffold eliminates *Candida albicans* biofilms. *Journal of Applied Microbiology*, <https://doi.org/10.1111/jam.14656>
24. Medina, S.A., Wall, N.A., Ivory, C.F., Clark, S.B. and Beyenal, H. 2020. Pre-concentration mechanism of trivalent lanthanum on eQCM electrodes in the presence of α -hydroxy isobutyric acid. *Journal of Electroanalytical Chemistry*, 857, <https://doi.org/10.1016/j.jelechem.2019.113731>
25. Liu, P., Liang, P., Beyenal, H., Huang, X. 2020. Overestimation of biofilm conductance determined by using the split electrode as the microbial respiration. *Journal of Power Sources*, 453, <https://doi.org/10.1016/j.jpowsour.2020.227906>
26. Liu, P., Mohamed, A., Liang, P. and Beyenal, H. 2020. Effect of electrode spacing on electron transfer and conductivity of *Geobacter sulfurreducens* biofilms, *Bioelectrochemistry*, 131, <https://doi.org/10.1016/j.bioelechem.2019.107395>
27. Tutar, S., Mohamed, A., Ha, P. and Beyenal, H. 2020. Electron donor availability controls scale up of anodic biofilms, *Bioelectrochemistry*, 132, <https://doi.org/10.1016/j.bioelechem.2019.107403>
28. Attaran, E., Berim, A., Killiny, N., Beyenal, H., Gang, D. R. and Omsland, A. 2020 Controlled replication of ‘*Candidatus Liberibacter asiaticus*’ DNA in citrus leaf discs. *Microbial Biotechnology*, 12.14.19. <https://doi.org/10.1111/1751-7915.13531>
29. Molki, B., Ha, P.T., Mohamed, A., Gang, D.R., Omsland, A. and Beyenal, H. 2019. Physiochemical changes mediated by “*Candidatus Liberibacter asiaticus*” in Asian citrus psyllids. *Scientific Reports*, 9:16375, <https://doi.org/10.1038/s41598-019-52692-7>
30. Ha, P.T., He, R., Killiny, N., Brown, J. K., Omsland, A., Gang, D.R. and Beyenal, H. 2019. Host-free biofilm culture of “*Candidatus Liberibacter asiaticus*,” the causative agent of Huanglongbing, *Biofilm*, <https://doi.org/10.1016/j.bioflm.2019.100005>
31. Deliorman, M., Duatepe, F.P.G., Davenport, E.K., Fransson, B., Call, D.R. and Abu-Lail, N.I. 2019. Responses of *Acinetobacter baumannii* bound and loose extracellular polymeric substances to hyperosmotic agents combined with or without tobramycin: an atomic force microscopy study. *Langmuir*, <https://doi.org/10.1021/acs.langmuir.9b01227>
32. Molki, M., Ha, P.T., Cohen, A.L., Crowder, D.W., Gang, D.R., Omsland, A., Brown, J.K. and Beyenal, H. 2019. The infection of its insect vector by bacterial plant pathogen "*Candidatus Liberibacter solanacearum*" is associated with altered vector physiology, *Enzyme and Microbial Technology*, 129, <https://doi.org/10.1016/j.enzmictec.2019.109358>
33. Kiamco, M.M., Zmuda, H., Mohamed, A., Call, D.R., Raval, Y.S., Patel, R. and Beyenal, H. 2019. Hypochlorous acid-generating electrochemical scaffold for treatment of wound biofilms, *Scientific Reports*, 9:2683, <https://doi.org/10.1038/s41598-019-38968-y>

34. Raval, Y.S., Mohammed, A., Zmuda, H., Patel, R. and Beyenal, H. 2019. Hydrogen-peroxide-generating electrochemical scaffold eradicates methicillin-resistant *Staphylococcus aureus* biofilms. *Global Challenges*, 1800101, <https://doi.org/10.1002/gch2.201800101>
35. Rincon, S.M., Urrego, N.F., Avila, K.J., Romero, H.M. and Beyenal, H. 2019. Photosynthetic activity assessment in mixotrophically cultured *Chlorella vulgaris* biofilms at various developmental stages. *Algal Research*, 38, <https://doi.org/10.1016/j.algal.2019.101408>
36. Mohamed, A., Ha, P.T., Peyton, B.M., Mueller, E., Meagher, M. and Beyenal, H. 2019. *In situ* enrichment of microbial communities on polarized electrodes deployed in alkaline hot springs. *Journal of Power Sources*, 547-556, <https://doi.org/10.1016/j.jpowsour.2019.01.027>
37. Molina, D.E., Medina, A.S., Beyenal, H. and Ivory, C.F. 2019. Design and finite elements model of a microfluidic platform with removable electrodes for electrochemical analysis. *Journal of Electrochemical Society*, B125-B132, <https://doi.org/10.1149/2.0891902jes>
38. Guo, F., Babauta, T.J. and Beyenal, H. 2018. Impact of intermittent polarization on electrode-respiring *Geobacter sulfurreducens* biofilms. *Journal of Power Sources*, 96-101, <https://doi.org/10.1016/j.jpowsour.2018.10.053>
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Peer-reviewed book chapters

169. Istanbulu, O., Babauta, J.T., Renslow, R.S. and Beyenal, H. 2020. Monitoring electron transfer rates of electrode-respiring cells. In *Microbial Electrochemical Technologies*, edited by Tiquia-Arashiro, S., P., Deepak, pp. 76-84. CRC Press. ISBN 978042948711.
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174. Abu-Lail, N. and Beyenal, H. 2013. Characterization of bacteria-biomaterial interactions from a single cell to microbial communities. In *Characterization of Biomaterials*, edited by Bose, S. and Bandyopadhyay, A., pp. 235-253, Elsevier, <http://dx.doi.org/10.1016/B978-0-12-415800-9.00006-1>
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Presentations (* invited)

1. * Beyenal, H. and Mohamed, A. Scalable biofilm electrodes. The 71st Annual Meeting of the International Society of Electrochemistry 30 August - 4 September, 2020, Belgrade, Serbia.
2. * Beyenal, H., Electrochemically active biofilms, School of Mines, Rapid City, ID, Chemical Engineering, September 2, 2019.
3. Raval, Y., Mohamed, A., Zmuda, H., Beyenal, H. and Patel, R. Anti-biofilm activity of a hydrogen peroxide generating electrochemical scaffold against dual-species *Staphylococcus aureus* and *Pseudomonas aeruginosa* biofilms. ASM Microbe, 2019 San Francisco, CA.
4. Babauta, J.T. and Beyenal, H. Analyzing *Geobacter sulfurreducens* biofilm impedance using eQCM and a small overpotential approximation. ASM Microbe, 2019 San Francisco, CA.
5. Elharati, M.A., Mohamed, A. and Beyenal, H. Biochemical oxygen demand microelectrode for quantifying concentration gradients in anaerobic biofilms. 235rd Electrochemical Society Meeting, May 26-30, 2019, Dallas, TX.
6. Mohamed, A., Tutar, S., Ha, P.T. and Beyenal, H. Scale up of biofilm electrodes. 235th Electrochemical Society Meeting, May 26-30, 2019, Dallas, TX.
7. Tibbits, G., Wall, N.A. and Beyenal, H. Thin hematite film based flavin microsensor. 235th Electrochemical Society Meeting, May 26-30, 2019, Dallas, TX.
8. *Beyenal, H. Role of electrochemical and chemical gradients in bioelectrochemical systems. Society of Industrial Microbiology, August 12-16, 2018, Chicago, IL.
9. Beyenal, H. Electrochemical and chemical gradients in electrochemically active biofilms. 256th American Chemical Society Meeting, August 19-23, 2018, Boston, MA.
10. Beyenal, H. Kiamco, M.M., Zmuda, H., Sultana, S., Mohamed, A., Call, D., Raval, Y.S. and Patel, R. Electrochemical bandage for wound healing. Military Health Research Symposium, August 19-23, Orlando, FL.
11. Zmuda, H.M., Kiamco, M.M., Mohamed, A., Patel, P. and Beyenal, H. Eradication of *Candida albicans* biofilm by electrochemical scaffold producing hypochlorous acid. 233rd Electrochemical Society Meeting, May 13-17, 2018, Seattle, Washington.
12. Mohamed, A., Zmuda, H.M., Coats, E.R. and Beyenal, H. Field demonstration of potentiostatically enriched microbial fuel cell wastewater treatment system. 233rd Electrochemical Society Meeting, May 13-17, 2018, Seattle, Washington.

13. Tutar, S., Mohamed, S., Ha, P.T. and Beyenal, H. Electron transfer rates of anodic biofilms at different sizes. 233rd Electrochemical Society Meeting, May 13-17, 2018, Seattle, Washington.
14. Mohamed, A. and Beyenal, H. Electrochemical scaffold for advanced wound management. Defense Innovation Technology Acceleration Challenges, Oct 3-5, 2017, Tampa, FL. Won innovation award.
15. Kiamco, M.M., Mohamed, A., Call, D. and Beyenal, H. Advanced treatment of biofilm-infected wounds by controlled local generation of hydrogen peroxide and hypochlorous acid on an electrochemical scaffold. Military Health System Research Symposium, August 27-30, 2017, Orlando, FL.
16. Kiamco, M.M., Mohamed, A., Call, D. and Beyenal, H. An electrochemical scaffold generating controlled low concentrations of hydrogen peroxide and hypochlorous acid as advanced treatment against wound-related biofilms. Symposium for Advanced Wound Care, Oct 20-22, 2017, Las Vegas, NV.
17. Falghoush, A., Beyenal, H., Besser, T., Omsland, A. and Call, D.R. Hypertonic treatment is a promising strategy to overcome antibiotic tolerant of *Acinetobacter baumannii* biofilm communities. American Society of Microbiology Annual Meeting, New Orleans, LA, June 2017.
18. *Beyenal, H. Electrochemically active biofilms. 229th Electrochemical Society Meeting, San Diego, CA, May 29–June 3, 2016.
19. Medina, A., Babauta, J.T. and Beyenal, H. An electrogravimetric approach: electrochemical pre-concentration of lanthanum as La(OH)₃. 229th Electrochemical Society Meeting, San Diego, CA, May 29–June 3, 2016.
20. Babauta, J.T., Medina, A. and Beyenal, H. EQCM and surface pH studies on lanthanum accumulation on electrodes in aqueous solution. 229th Electrochemical Society Meeting, San Diego, CA, May 29–June 3, 2016.
21. *Beyenal, H. Electron transfer mechanisms in biofilms. Workshop of US–China Collaborative Research on Microbe-Mineral Interaction: Microbial Extracellular Electron Transfer with Minerals as Electron Sources and Sinks, March 23-25, 2015, Zhongguanyuan Global Village PKU, Beijing, China.
22. Kiamco, M.M., Khan, Q., Atci, E., Mohamed, A., Fransson, B., Call, D., Abu-Lail, N. and Beyenal, H. Combination of hyperosmotic agent and antibiotic enhances oxygen penetration into *Staphylococcus aureus* biofilms. SAWC Fall Meeting, September 26-28, 2015, Las Vegas, NV.
23. Kagan, J.A., Hsu, L., Higier, A., Arias-Thode, Y.M., Chadwick, D.B. and Beyenal, H. Design and performance considerations for benthic microbial fuel cells, Oceans 2014, St. John's, NL, Canada.
24. Kiamco, M.M., Khan, Q., Atci, E., Mohamed, A., Lone, A., Fransson, B., Abu-Lail, N. Call, D. and Beyenal, H. Oxygen profiling and its biokinetics in wound biofilms with and without treatment. SAWC Fall Meeting, October 16-18, 2014, Las Vegas, NV.
25. Lone, A., Orfe, L., Beyenal, H., Park, J-J., Gang, D.R., Fransson, B., Abu-Lail, N. and Call, D.R. Porcine explant model yields multiple soluble compounds of physiological importance from MRSA biofilms. ASM 114th General Meeting, May 17-20, 2014, Boston, MA.
26. Harrington, T.H. and Beyenal, H. *Geobacter sulfurreducens* biofilm growth kinetics on high surface area, flow-through anodes under ion-transport limitations. 225th ECS Meeting, May 11-15, 2014, Orlando, FL.
27. Beyenal, H., Babauta, J.T. and Renslow, R.S. Electrochemically active biofilms and their role in extracellular electron transfer processes. 225th ECS Meeting, May 11-15, 2014, Orlando, FL.
28. Renslow, R.S., Majors, P.D., Beyenal, H. Mass transfer and metabolic variability in electrochemically active biofilms. 225th ECS Meeting, May 11-15, 2014, Orlando, FL.
29. Babauta, J. T., Beyenal, H. Electrochemical impedance spectroscopy of *Geobacter sulfurreducens* biofilms on rotating disk electrodes. 225th ECS Meeting, May 11-15, 2014, Orlando, FL.
30. Beyenal, H., Kiamco, M.M., Khan, Q., Atci, E., Fransson, B., Call, D., Abu-Lail, N. and Renslow, R.S. Hyperosmotic agents can enhance antibiotic efficacy against MRSA biofilms, SAWC Spring Meeting, April 23-27, 2014, Orlando, FL.

31. Call, D., Lone, A., Beyenal, H., Fransson, B., Abu-Lail, N. and Renslow, R.S. MRSA biofilms deplete oxygen within skin explants, SAWC Spring Meeting, April 23-27, 2014, Orlando, FL.
32. Kiamco, M.M, Khan, M.T.K., Abu-Lail, N., Call, D. and Beyenal, H. How biofilm inhibitors affect biofilm structure. 2013 BMES Annual Meeting, September 25-28, Seattle, WA.
33. Beyenal, H., Sultana, S. and Babauta, J. Mechanism of electrochemical biofilm control and its applications. 2013 BMES Annual Meeting, September 25-28, Seattle, WA.
34. Tran, V., Harrington, T.D., Mohamed, A. and Beyenal, H. Electron transfer mediator increases production of 1,3-propanediol, 2013 BMES Annual Meeting, September 25-28, Seattle, WA.
35. *Beyenal, H. Sediment microbial fuel cells. 2nd Marine and Renewable Energy Workshop, September 12-14, 2013, Jeju, Korea.
36. Renslow, R., Babauta, J. and Beyenal, H. Integration of electrochemical methods with magnetic resonance and electron microscopies for the study of *Geobacter sulfurreducens* biofilms. Microscopy and Microscopy Analysis 2012 Meeting, July 29–August 2, Phoenix, AZ.
37. Beyenal, H., Babauta, J. From electron mechanisms in biofilms to practical applications. 221st ECS Meeting, May 6-10, Seattle, WA.
38. Renslow, R., Babauta, J., Schenk, J.O., Ivory, N. and Beyenal, H. A dual extracellular electron transfer mechanism biofilm model. 221st ECS Meeting, May 6-10, Seattle, WA.
39. Babauta, J., Nguyen, H. and Beyenal, H. pH and redox potential variations in an anodic biofilm located in a three-electrode bioreactor and a microbial fuel cell. 221st ECS Meeting, May 6-10, Seattle, WA.
40. Istanbulu, O., Babauta, J., Beyenal, H. A method to monitor biofilm formation from single cells to multicellular communities in food processing systems. Materials Research Society, 2012 Spring Meeting and Exhibit, San Francisco, CA.
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