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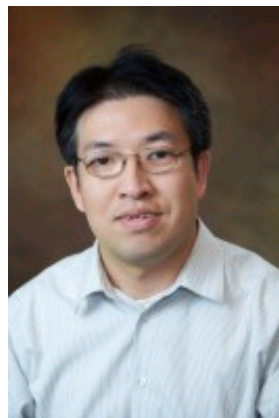
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Home About the College Faculty Ren

Faculty and Staff



Dacheng Ren

Biomedical and Chemical
Engineering
Biomaterials/Tissue Engineering,
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Indoor Air Quality, Molecular
Biotechnology, Rehabilitative and
Regenerative Engineering, Smart
Materials for Healthcare,
Sustainable Energy Production,
and Systems Biology / Metabolic
Engineering
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Title: Associate Professor, Chemical Engineering Graduate Program Director

Degree(s):

- B.E. (major) Applied Chemistry, Shanghai Jiao Tong University, P. R. China, 1996.
- B.E. (minor) Electrical Engineering, Shanghai Jiao Tong University, P. R. China, 1996.
- M.E. Chemical Engineering, Tianjin University, P. R. China, 1999.
- Ph.D. Chemical Engineering, University of Connecticut, Storrs, CT, 2003
- Postdoctoral associate, Chemical Engineering, Cornell University, Ithaca, NY, 2003-2005.

Current Research:

Historically, our understanding of bacterial physiology and development of antibiotics have been focused on planktonic (free-swimming) cells. However, the vast majority of bacteria in nature exist in surface-attached highly hydrated structures comprising of a polysaccharide matrix secreted by the bound bacterial cells, collectively known as biofilms. With up to 1000 times higher tolerance to antibiotics and disinfectants compared to their planktonic counterparts, deleterious biofilms cause serious problems such as chronic infections in humans as well as persistent corrosion and equipment failure in industry. Biofilms are blamed for billions of dollars of losses and more than 45,000 deaths annually in the U.S. alone. Despite the well-recognized significance of biofilms, the biofilm research is still in its infancy. With the efficacy of antibiotics and disinfectants being intrinsically limiting, new approaches especially those with synergistic effects are desired.

Compared to the deleterious biofilms, which cause serious problems in both medical and engineering environments, biofilms of environmentally friendly bacteria have promising applications. Due to their intrinsic tolerance to toxic agents, such biofilms may provide promising solutions to currently unmet challenges such as the high cost in biofuel production due to the low tolerance of microbes to fermentation products and difficulties in bioremediation of toxic contaminants.

In the Biofilm Engineering Laboratory, we have broad interests in biofilm research including genetic basis of multidrug resistance, biofilm control through surface engineering and bioelectric effects, development of novel biofilm and persister inhibitors, as well as biofilm engineering for biofuel production.

Teaching Interests:

- CEN252 Chemical Engineering Thermodynamics I
- CEN551 Biochemical Engineering
- BEN301 Biological Principles for Engineers

Honors:

- NSF CAREER Award 2011-2016.
- College Technology Educator of the Year, Technology Alliance of Central

New York (TACNY), 2010.

- Early Career Translational Research Award in Biomedical Engineering from the Wallace H. Coulter Foundation, 2009.

Recent Publications:

Jiachuan Pan, Ali Adem Bahar, Haseeba Syed, and Dacheng Ren. "Reverting antibiotic tolerance of *Pseudomonas aeruginosa* PAO1 persister cells by (Z)-4-bromo-5-(bromomethylene)-3-methylfuran-2(5H)-one". PLoS ONE. 2012, 7(9): e45778. doi:10.1371/journal.pone.0045778.

Tagbo H. R., Niepa, Jeremy L. Gilbert and Dacheng Ren. "Controlling *Pseudomonas aeruginosa* persister cells by weak electrochemical currents and synergistic effects with tobramycin". *Biomaterials*. 2012, 33: 7356–7365.

Robert Szkotak, Tagbo H R Niepa, Nikhil Jawrani, Jeremy L Gilbert, Marcus B Jones and Dacheng Ren. "Differential Gene Expression to Investigate the Effects of Low-level Electrochemical Currents on *Bacillus subtilis*". *AMB Express*. 2011, 1:39.

Xi Chen, Mi Zhang, Chunhui Zhou, Neville R. Kallenbach and Dacheng Ren, "Control of bacterial persister cells by Trp/Arg antimicrobial peptides". *Applied and Environmental Microbiology*. 2011, 77(14): 4878-4885.

Wen-Hsuan Huang, Zhiqiang Wang, Geetika Choudhary, Beverly Guo, Jianshun Zhang and Dacheng Ren*, "Characterization of Microbial Species in a Regenerative Bio-filter System for VOC Removal". 2011. *HVAC&R Research*. Accepted.

Shuyu Hou†, Huan Gu†, Cassandra Smith and Dacheng Ren, "Microtopographic patterns affect *Escherichia coli* biofilm formation on polydimethylsiloxane surfaces". *Langmuir*. 2011, 27(6): 2686-2691. †These authors contributed equally.

Jensen Zhang, Zhiqiang Wang and Dacheng Ren, "Botanical Air Filtration for Improving IAQ: Myths and Facts." *ASHRAE Journal*. 2010, Dec.:138-140

Shuyu Hou, Zhigang Liu, Anne Young, Sheron Mark, Neville Kallenbach and Dacheng Ren, "Structural effects on inhibition of planktonic growth and biofilm formation of *Escherichia coli* by Trp/Arg containing antimicrobial peptides." *Applied and Environmental Microbiology*. 2010,76(6): 1967-1974.

Marcus B. Jones, Scott N. Peterson, Rosslyn Benn, John C. Braisted, Behnam Jarrahi, Kenneth Shatzkes, Dacheng Ren, Thomas K. Wood and Martin J. Blaser, "Role of luxS in *Bacillus anthracis* growth and virulence factor expression". *Virulence*. 2010, 1(2): 72-83.

Tianzhu Zang, Bobby W.K. Lee, Lisa M. Cannon, Kathryn A. Ritter, Shujia Dai, Dacheng Ren, Thomas K. Wood, and Zhaohui Sunny Zhou, "A Naturally Occurring Brominated Furanone Covalently Modifies and Inactivates LuxS".

Bioorganic & Medicinal Chemistry Letters. 2009, 19(21):6200-6204.

Shuyu Hou, Chunhui Zhou, Zhigang Liu, Anne W. Young, Zhengshuang Shi, Dacheng Ren and Neville R. Kallenbach, "Antimicrobial dendrimer active against Escherichia coli biofilms". Bioorganic & Medicinal Chemistry Letters. 2009, 19(18): 5478-5481.

Jiachuan Pan and Dacheng Ren, "Quorum sensing inhibitors: a patent overview". Expert Opinion On Therapeutic Patents (Invited Review). 2009, 19(11):1581-1601.

Miao Duo, Mi Zhang, Yan- Yeung Luk and Dacheng Ren, "Inhibition of Candida albicans Growth by Brominated Furanones". Applied Microbiology and Biotechnology. 2009, 84(6):1551- 1563.

Jian Wu†, Shuyu Hou†, Dacheng Ren and Patrick T. Mather, "Antimicrobial Properties of Nanostructured Hydrogel Webs Containing Silver". Biomacromolecules. 2009(10): 2686- 2693. †These authors contributed equally.

Shuyu Hou, Erik A. Burton, Ricky Lei Wu, Yan- Yeung Luk and Dacheng Ren, "Prolonged Control of Patterned Biofilm Formation by Bio- inert Surface Chemistry". Chemical Communication. 2009: 1207- 1209.

Erik A. Burton, Karen A. Simon, Shuyu Hou, Dacheng Ren, and Yan- Yeung Luk, "Molecular Gradients of Bio- inertness Reveal Mechanistic Difference between Mammalian Cell Adhesion and Bacterial Biofilm Formation". Langmuir. 2009, 25(3): 1547- 1553.

Miao Duo, Shuyu Hou, and Dacheng Ren, "Identifying Escherichia coli genes involved in intrinsic multidrug resistance" Applied Microbiology and Biotechnology. 2008, 81(4): 731- 741.

Yongbin Han, Shuyu Hou, Karen A. Simon, Dacheng Ren, and Yan- Yeung Luk "Identifying the important structural elements of brominated furanones for inhibiting biofilm formation by Escherichia coli" Bioorganic & Medicinal Chemistry Letters. 2008, 18: 1006- 1010.

Shuyu Hou, Erik A. Burton, Karen A. Simon, Dustin Blodgett, Yan- Yeung Luk, Dacheng Ren, "Inhibiting Escherichia coli Biofilm Formation by Self- Assembled Monolayers of Functional Alkanethiols on Gold." Applied and Environmental Microbiology. 2007, 73: 4300- 4307.

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