DEPARTMENT OF BIOLOGICAL SCIENCES

Antibacterial strategies

Research Resources/Interests

Diverse collection of bacteria

The laboratory has a diverse collection of bacteria for testing antimicrobial agents/materials (clinical standards, reporter strains, mutagenicity testing, select pathogens and simulants for pathogens.

Assays for antimicrobial mechanism

Live Dead staining - Propidium Iodide (red) and Live-Dye (green) coupled with fluorescence microscopy.

Development of biosensor strains – strains with luminescent reporter genes to respond to specific modes of killing.

Biofilm Reactors

Two CDC biofilm reactors from BioSurface Technologies for growing biofilms on various surface materials and assaying for attachment, growth and viability.

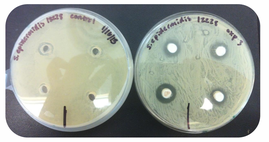
Diffusion and MIC assays

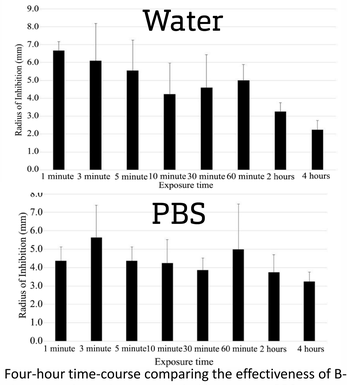
Well/disk diffusion , MIC assays for antimicrobial agents and materials.

Screening for new antibiotics/antimicrobials

Isolating and characterizing environmental microbes for antimicrobial activities.

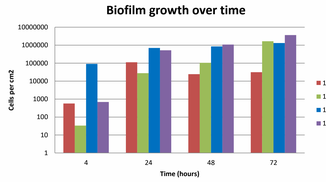
Antimicrobial activities

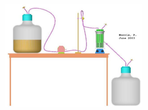




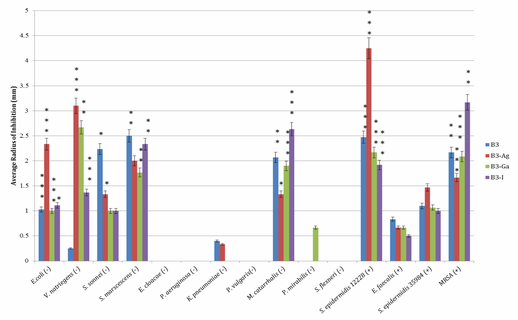
Four-hour time-course comparing the effectiveness of B-13 silver-glass over time when suspended in water vs PBS.

Biofilm studies





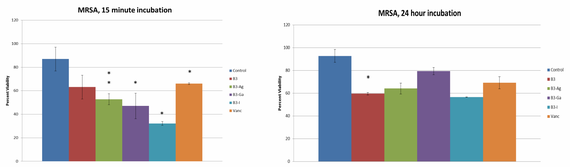
Antibacterial Properties of Borate Glasses

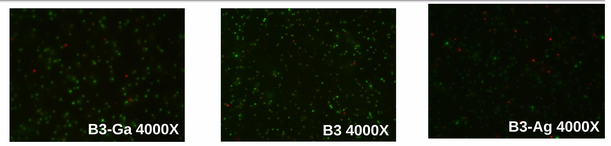


Oil vapors

Bacteria	Control	Diesel S	Diesel 15	Methyl soyate S	Methyl soyate 15	JP-8 S	JP-8 15
Shigella flexneri	+	-	-	-	-	PG	-
Klebsiella pneumoniae	+	-	-	-	-	+	-
Bacillus megaterium	+	-	-	-	-	-	-
Pseudomonas aeruginosa	+	-	-	-	-	+	-
Enterobactier cloacae	+	-	-	-	-	+	-
Staph aureus	+	-	-	-	-	+	-
E. Ccli	+	-	-	PG	-	+	-
Salmonella typhimuirum	+	-	-	-	-	+	-
Serratia marcescens	+	-	-	-	-	-	-

Live/Dead Assay Shows Change in Viability with Glass Exposure





Green: Live cells, Red: Live cells, Yellow: Overlapping live and dead cells

Left: *Bar graph representing changes in viability of MRSA gained from Live-Dead Staining Fluorescence Microscopy.* Top Right: *Images of MRSA with 24 hour exposure to borate glasses*

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Funding

S&T Center for Biomedical Research, USDA, Missouri Soybean Merch. Council, Department of Higher Education, DOW Chemical Co., Pegasus

Keywords

•Antibacterial materials, Biofilms, Viability Assays

Recognitions/Significant achievements

•Curators Distinguished Teaching Professor
•College of Arts, Sciences, and Business Dean's Medal
•American Society for Microbiology Casrki Award
•UMSystem President's Award for Community Engagement
•DAAD Research Ambassador/Humboldtian on Campus
•HHMI Biointeractive Teaching Ambassador

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