Sterilex Focus: Anti-Biofilm and Disinfectant Technologies

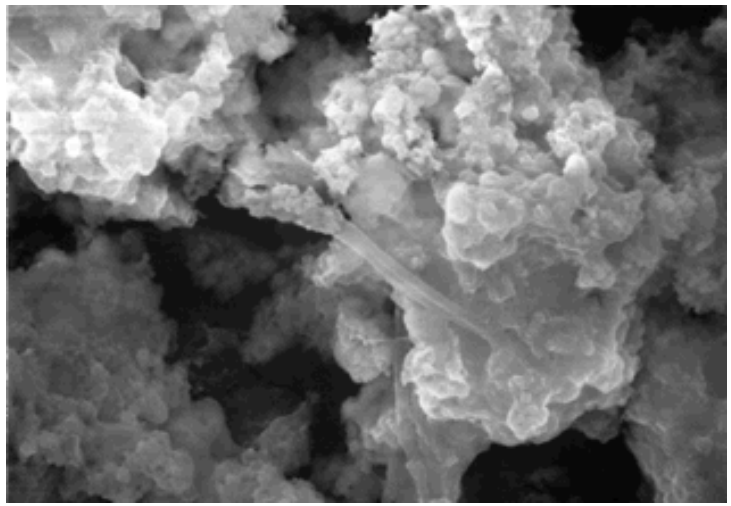
- Development of products that ***remove biofilm***, ***kill biofilm microorganisms, and disinfect food contact surfaces***
- Regulatory approval of biofilm claims: Only company to have EPA-registered anti-biofilm claims on public health and industrial use products

USDA National Research Initiative Grant

- Sterilex awarded a USDA National Research Initiative Grant entitled: "**Improved Methods to Control Biofilms Containing Listeria monocytogenes in Meat and Poultry Processing Environments"**

Biofilm is a Significant Barrier to Disinfection

- **Biofilm: Highly structured, matrix-encased cooperative communities of microorganisms**
- **Natural habitat for microorganisms**
- **Biofilm-related resistance factors a major component of failure of antimicrobials**



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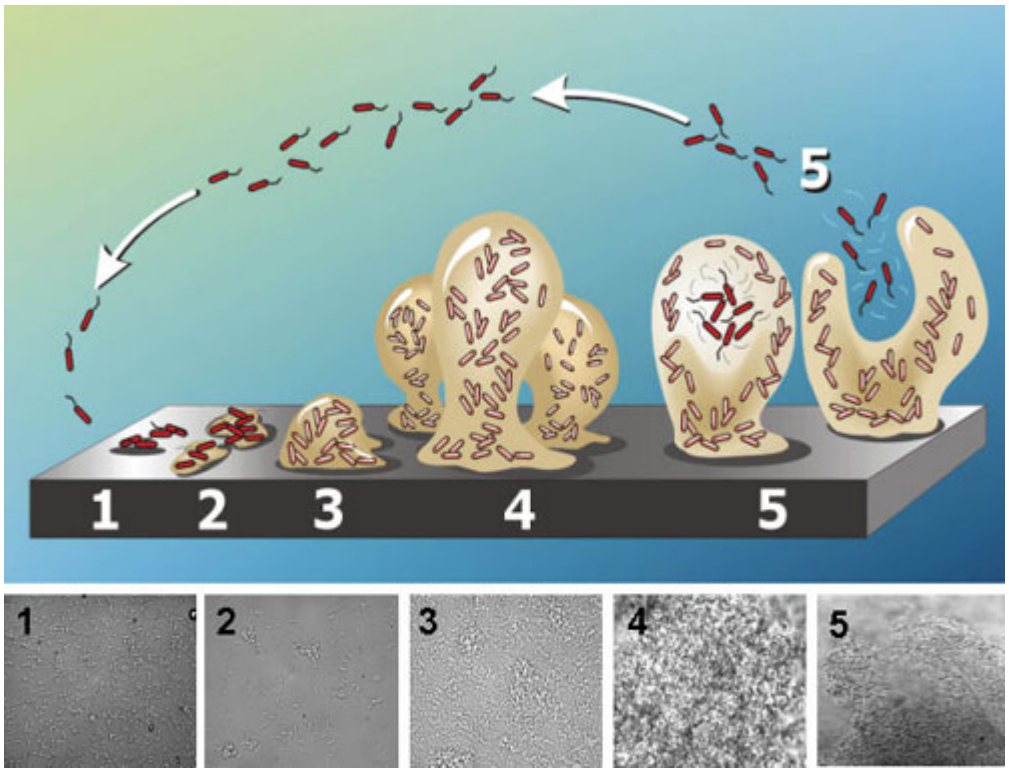
Biofilm Life-Cycle



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Issues In The Control of Biofilm

- Polymer matrix strongly adheres to surfaces
- Microorganisms in biofilms express resistance (1000 times the dose of antimicrobials required)
- Biofilms more likely in wet, inaccessible areas and corroded surfaces
- Conventional antimicrobials are not designed to penetrate biofilm
- Not sufficient to kill the organisms – must remove the reservoir
- High Risk of false negative sampling

Problems Associated With Biofilms

- Cross contamination of biofilm microorganisms
- Decreased shelf life
- Spikes in microbial counts
- Reduction of heat transfer or impairment of detection devices

Case Study: Listeria in RTE Plant

- **Issue**
  - Listeria in a RTE deli plant – closed by USDA
- **Background**
  - Failure of the standard sanitation protocol due to the presence of bacterial biofilms in drains at the processing facility, and the inability of standard chemicals to remove them.
- **Sterilex solution**
  - Shock treatment: 5 days of daily treatment to drains with Sterilex Biocide. 5 days of daily treatment to equipment, walls, ceilings and floors with the use of Sterilex Ultra Disinfectant Cleaner[1].
  - Maintenance: Daily use of Sterilex Biocide in drains; weekly use of Sterilex Ultra Disinfectant Cleaner on processing equipment, walls, and ceilings[1] .
- **Outcome**
  - Re-opened after the 5-day shock treatment; zero counts; no *Listeria* positives.

[1] Potable water rinse required

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Case Study: Pork Processing Plant

- Issue
  - Consistently high *Listeria* and bacterial counts and poor shelf life – had tried "everything". Plant threatened with regulatory action.
- Background
  - Used alkaline and acid cleaners in rotation, and routine no-rinse sanitizers including peracetic acid.
- Sterilex solution
  - Alternate the cleaning of belts out of place (COP) and soaking in a 5% solution of Sterilex Ultra Disinfectant Cleaner every night after production[1] .
  - Meat grinder equipment parts cleaned out of place (COP) and soaked every night for 30 minutes to 1 hour in a 5 % solution of Sterilex Ultra Disinfectant Cleaner[1] .
  - All hard surfaces, e.g. walls, countertops etc, sprayed/foamed once per week with a 5 % solution of Sterilex Ultra Disinfectant Cleaner [1].
- Outcome
  - Increase in shelf life.
  - After 6 months, the plant maintains successful control of Listeria and bacterial counts .

[1] Potable water rinse required

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Case Study: Beef Processing Plant

- Issue
  - Plant had high bacterial counts and shelf life issues
- Background
  - Usual protocol not effective
- Sterilex solution
  - Use Sterilex Ultra Disinfectant Cleaner daily [1] on all production lines (foam on belts and framework; soak ground beef parts); in slaughter room, foam onto ceilings, walls, and floors
- Outcome
  - Extended shelf life 3 days; dramatically reduced bacterial counts

[1] Potable water rinse required

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Summary

- Biofilms are the natural habitat for bacteria
- Biofilms cause cross contamination and are a cause of repetitive microbial failures and unsatisfactory shelf life
- Biofilms are difficult to detect and treat with routine sampling and sanitation protocols
- Older plants are at increased risk
- Control of biofilms has been shown to improve microbiological control of the plant environment