Reducing Listeria Formations on Stainless Steel with Dursan® Coating Technology

A SILCOTEK® CASE STUDY WITH:

This case study is a summary of the paper "Listeria Monocytogenes Biofilm Formation as Affected by Stainless Steel Surface Topography and Coating Composition" which was published in the journal, Food Control, May of 2021.

The study was conducted in collaboration with Department of Biomedical and Nutritional Sciences at the University of Massachusetts, Lowell and the Agricultural Research Service at the United States Department of Agriculture.

Dursan has a "strikingly high fouling resistance."

-Quote from Food Control Journal article

SUMMARY:

Listeria is a bacteria that can grow, accumulate, and transfer in a variety of foods, causing foodborne illness ranging from digestive issues to morbidity. A collaborative research effort with the University of Massachusetts and the US Department of Agriculture developed a study (which can be read in full here) investigating surface treatments on 304 stainless steel to prevent the growth and spread of listeria.

CHALLENGES:

Food processing equipment manufacturers typically use 304 stainless steel due to its relatively high corrosion resistance, its durability, and low cost compared to specialty steel alloys. Because 304 stainless steel is not an inert surface, it allows for the growth and transfer of listeria bacteria onto other surfaces that it comes in contact with. The research group tested 5 coatings and surface treatments that were FDA and USDA compliant as well as different surface roughnesses to determine the best surface for reducing listeria biofilm formations.

HOW SILCOTEK HELPED:

SilcoTek's Dursan coating technology has previously acted as an excellent bio-inert barrier in the medical and analytical space, so there was reason for confidence in its ability to reduce listeria formation. Dursan shows great fouling resistance, which can be attributed to its ability to interrupt protein adsorption via electrostatic interaction. Keep reading onto page 2 for the results of the study.

GAME-CHANGING BENEFITS:

Quantifying the listeria biofilm formation was done two ways: CV staining, to quantify the total biomass on the surface and plate counts, to determine how much of the total biomass is viable listeria cells that can make a person sick.

The CV staining results (Image 1) show that only 3 coatings were effective in providing statistically lower biomass accumulation, and Dursan was one of those 3.

The plate count that measured the viable cells showed that, regardless of surface topography, Dursan is the only coating that was able to decrease active cells from the surface. On some of the samples, the results showed up to a roughly 4 order of magnitude reduction in viable cell count.

Dursan's ability to significantly reduce the amount of biomaterial will provide an excellent option for reducing the formation of listeria and ultimately creating a safer option for food processing parts. SilcoTek was very pleased to be considered in this study, and we thank the Department of Biomedical and Nutritional Sciences at the University of Massachusetts, Lowell and the Agricultural Research Service at the United States Department of Agriculture for including Dursan in their efforts.

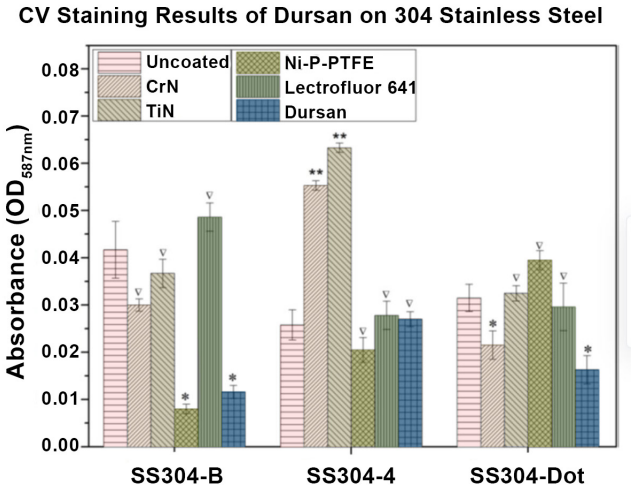

Image 1: CV staining showing Dursan reducing the biomass accumulation.

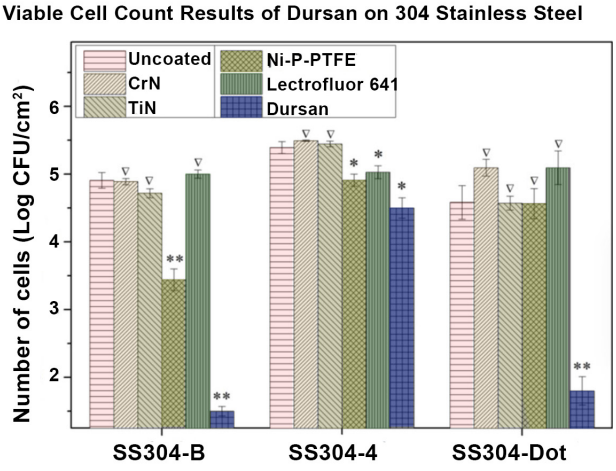

Image 2: The results of the viable cell counts show that Dursan is the only coating that is able to decrease active cells from the surface.

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"Listeria monocytogenes biofilm formation as affected by stainless steel surface topography and coating composition"; TingtingGua; ApisakMeesrisoma; YaguangLuob; Quynh N.Dinha; SophiaLina; ManyunYang; ArnavSharma; RuoguTang; JindeZhang; ZhenJia; Patricia D.Millner; Arne J.Pearlstein; BoceZhang: Food Control, Volume 130, December 2021, 108275