

Bio-mimetically Patterned Surfaces (BPS) for Food Safety Research

Understanding produce topography and plant-bacteria interaction on produce surfaces is critical to developing effective sanitizing treatments to remove and inactivate pathogens and improve food safety. However, large variations of topography and surface chemistry on produce surfaces, and the lack of tools to reproduce topography and surface chemistry, significantly hinder research progress in this field.

Scientists at the USDA-ARS fabricated, for the first time, biomimetic plant surfaces that achieve high fidelity to the topography and microstructure of spinach leaf and cantaloupe rind surfaces, using either agar or polydimethylsiloxane (PDMS). A key advantage of this approach is that it facilitates reproducibility of experiments involving disinfection and attachment/release of microbes from surfaces having microstructure identical to real produce surfaces, but without any of the leaf-to-leaf or plant-to-plant variation.

Experiments show that high-fidelity topography, structural stability, and the capability to integrate with instrumentation for studying bacterial growth and survival, are all possible on PDMS-, and AGAR-based biomimetic surfaces. The methods are easy to use, and the artificial surfaces are inexpensive to make. The technology will be of great interest in food safety related research aimed at understanding bacteria-host interaction, developing prospective control measures, and providing rapid and sensitive detection for quality assurance and quality control.