Plasma in Hydroponics and in Produce Washing

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Food safety is the ever-expanding global need. An important concern is the presence of bacteria and other pathogens on the surface of fresh produce. Plasmas, of course, are well-known for their strong antimicrobial properties. In the field of plasma medicine, a number of discharges have already been developed where plasma can successfully come in contact with living tissue, without damaging it, and achieve the desired rate of pathogen inactivation—usually within a few seconds of treatment. However, delivering plasma treatment to a 3-dimentional complex surface of foodstuffs, specifically of fresh produce, can be quite challenging: produce surface is complex and frequently multi-layered (e.g. a bag of spinach leaves), and the industrial processing rates are very high. For this reason, we have developed two systems to address this issue: 1) plasma jet-like system where an air stream containing small droplets of water is passed through the discharge and onto the surface of produce; and 2) gliding arc plasmatron system used for treatment of large volume of flowing liquid (the liquid is subsequently used for produce washing). The key challenges, addressed in this talk, are the control of temperature of air and water passing through the discharge, and the resulting chemistry generated in the liquid.

This research was supported, in part, by funding from USDA-NIFA Program on Enhancing Food Safety through Improved Processing Technologies (A4131) grant number 2015-68003-23411.