Behold the 9-day fresh strawberry: New approach to slowing rot doubles berry shelf life

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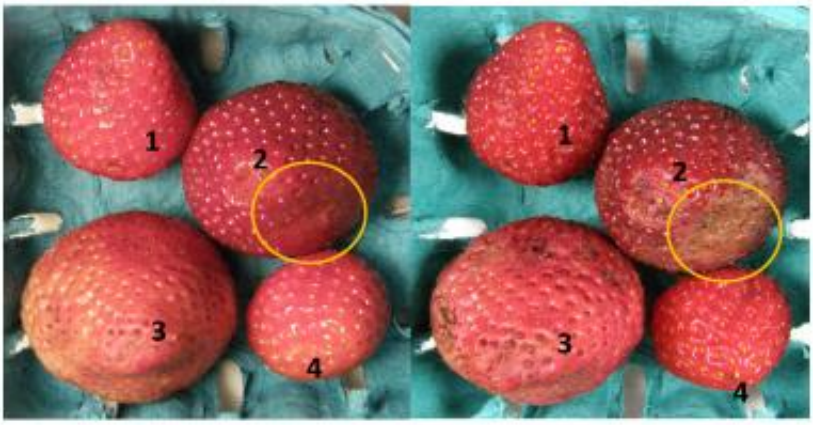
Dark Control: before test (left) and at end of test (right)

The control sample shows mold growth on the strawberries after seven days. Credit: Sensor Electronic Technology Inc (SETi).

Strawberry lovers rejoice: the days of unpacking your luscious berries from the refrigerator only to find them sprouting wispy goatees of mold may be numbered. A research team from the U.S. Department of Agriculture's (USDA) Food Components and Health Laboratory in Beltsville, Md., and Sensor Electronic Technology, Inc. (SETi) in

Columbia, S.C., has demonstrated that low irradiance ultra-violet (UV) light directed at strawberries over long exposure periods at low temperature and very high humidity—typical home refrigerator conditions—delays spoilage. The team used a novel device incorporating light-emitting diodes (LEDs) that emit UV at wavelengths found in sunlight transmitted through Earth's atmosphere. The results, which will be presented next week at the Conference on Lasers and Electro-Optics (CLEO: 2013), are significant because previous attempts using traditional UV light sources for storage of produce resulted in severe drying, and it was unknown if the advantages of long exposure to low-level UV light would be effective against rot.

LEDs are now commonplace thanks to their long life and energy efficiency, as well as their ability to span the wavelength range from near UV to infrared. The full UV spectrum, however, had presented challenges for LED manufacturers – until recently. SETi developed a special technology to fabricate UV LEDs across the entire UV spectrum from UVA to UVC. This flexibility allowed them to tune the emitted light to the wavelengths most effective for this application.

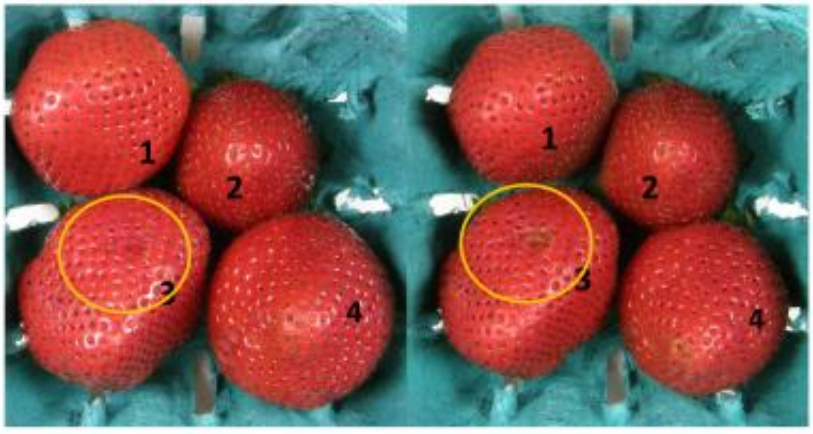


Illuminated with UVC: before test (left) and at end of test (right)

UV-C treatment exacerbated existing damage in the strawberries even while inhibiting mold growth. Credit: Sensor Electronic Technology Inc (SETi).

"UV-LEDs presented the opportunity to try low power devices that work well in the cold and can be engineered to work in small spaces such as refrigerator compartments," says lead USDA researcher Steven Britz, who will present the work at CLEO: 2013.

Using strawberries purchased from a local supermarket, Britz's team placed one batch in a dark refrigerator and one batch in a refrigerator exposed to UV-LEDs. Results showed the UV-treated berries had their shelf life extended twofold—nine days mold-free—over darkened berries, as judged by weight, moisture content, concentration of select phytochemicals, visible damage, and mold growth.



Illuminated with UVB: before test (left) and at end of test (right)

UV-B (equal energy) treatment prevents damaged areas from spreading while

also inhibiting mold growth. This is a critical aspect of the technology -- the ability to "tune" the UV to the most effective part of the spectrum, something that would be difficult and much less efficient using a typical mercury UV source. Credit: Sensor Electronic Technology Inc (SETi).

Based on these encouraging results, the team is working to commercialize the technology for home refrigerators.

"These findings are expected to have a major impact on the appliance business to extend the shelf life and preserve nutritional value of fresh produce while reducing waste and saving money for every household," states Remis Gaska, president and CEO of SETi.

More information: CLEO: 2013 presentation ATh3N.3. "Deep Ultraviolet (DUV) Light-Emitting Diodes (LEDs) to Maintain Freshness and Phytochemical Composition During Postharvest Storage" by Stephen Britz will take place Thursday, June 13 at 2:45 p.m. in the San Jose Convention Center.

Provided by Optical Society of America