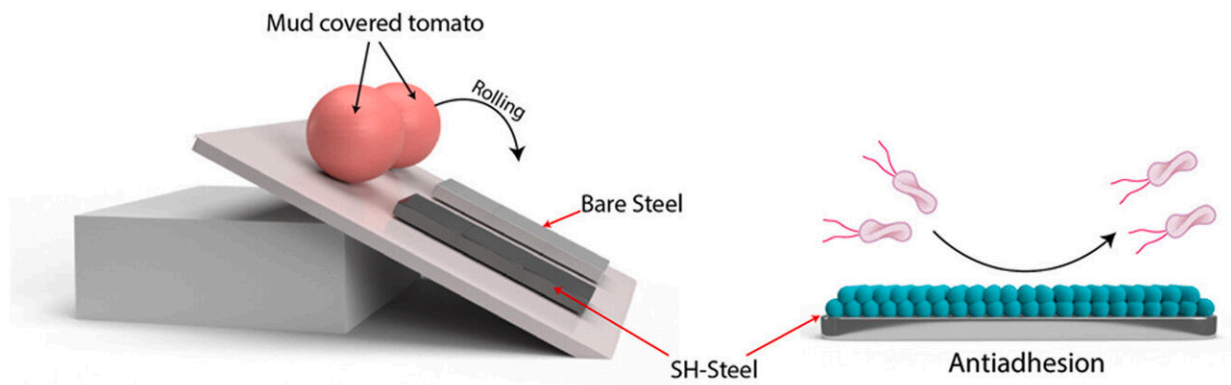


# Researchers create coating solution for safer food storage

February 6 2024, by Raven Wuebker



Graphical abstract. Credit: *Journal of Food Engineering* (2023). DOI: 10.1016/j.jfoodeng.2023.111784

In a collaborative effort to improve the food industry, Dr. Mustafa Akbulut, professor of chemical engineering, and Dr. Luis Cisneros-Zevallos, professor of horticultural science, have developed a two-step

coating solution for galvanized steel that is more hygienic and reduces the risk of corrosion.

Galvanized steel containers and surfaces are used for harvested produce because of their durability, strength and lower cost compared to [stainless steel](#). However, bacteria residing in storage containers can cause corrosion.

The new coating will reduce corrosion by at least 70%, Akbulut said.

"This material is more durable and doesn't experience corrosion," Akbulut said. "The surface itself can repel the bacteria so it doesn't get germs stuck on it. Normal steel tends to collect pathogens and microorganisms, but the coated steel is overcoming that issue. These are the main benefits of this technology."

The coating method for galvanized steel exhibits superhydrophobicity and antifouling capabilities, effectively inhibiting the attachment of fungi, bacteria and mud. This research was published in the [Journal of Food Engineering](#).

"This will have an impact because the people that consume fruits and vegetables trust that they're buying something safe, and it will not affect their health," Cisneros-Zevallos said. "Right now, the industry does their best to reduce those risks, but you will hear about outbreaks of these contaminations and people getting sick. There are sometimes reported deaths because of these events."

During the [coating process](#), the [material properties](#), structural properties and mechanical strength of steel do not change. Only the very top layer of the steel is coated, since that is where food comes in contact with the surface, Akbulut said.

Research shows that this coating decreases bacterial strains over seven days and reduces adherence to *Aspergillus*, a foodborne fungi.

This coating technology can potentially be used on grain storage silos, along with other food-related storage units and containers, according to the article. This is a significant boon to the multidisciplinary fields of food engineering, safety and processing.

The galvanized steel coating will also benefit agricultural farmland, according to Akbulut.

"Many of the food-produced commodities come to the industrial setting in some sort of soil, debris or mud," Akbulut said. "So, even if the produce is washed, these commodities can cause contamination. With this technology, we are reducing mud-related contamination."

With the information gathered from the research, Cisneros-Zevallos said they could eventually adapt and utilize these technologies to revolutionize fewer outbreaks and positively impact the [food industry](#).

"Our goal is to make the industry adopt this," Cisneros-Zevallos said. "Processors will benefit in the sense that they will be handling something that they can deliver in a trustful way to consumers, and consumers will benefit because they will have something that will be safe for them."

From the field to the consumer, contamination can be minimized by using these kinds of surfaces and avoiding cross-contamination, as explained by Cisneros-Zevallos.

"With this research, we are ensuring that the technological developments from other fields are being pursued and implemented in agriculture," Cisneros-Zevallos said. "The agricultural field is catching up with other technologies. This coating directly impacts our daily life and the food

we're trying to make safer."

Contributors to the research include doctoral students Wentao Zhou, Shuhao Liu, and William DeFlorio from the Artie McFerrin Department of Chemical Engineering, along with Professor Jun Kyun Oh and doctoral students Sang Ha Song and Hayoung Choi in the Department of Polymer Science and Engineering, Dankook University.

**More information:** Wentao Zhou et al, Nanostructured antifouling coatings for galvanized steel food storage and container surfaces to enhance hygiene and corrosion resistance against bacterial, fungal, and mud contamination, *Journal of Food Engineering* (2023). [DOI: 10.1016/j.jfoodeng.2023.111784](https://doi.org/10.1016/j.jfoodeng.2023.111784)

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