# Smartphone screen technology used to trick harmful bacteria

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Conducting plastics found in smartphone screens can be used to trick the metabolism of pathogenic bacteria, report scientists at the Swedish Medical Nanoscience Center at Karolinska Institutet in the scientific journal npj Biofilms and Microbiomes. By adding or removing electrons from the plastic surface, bacteria may be tricked into growing more or less. The method may find widespread use in preventing bacterial infections in hospitals or improve effectiveness in wastewater management.

When bacteria attach to a surface they grow quickly into a thick film known as a biofilm. These biofilms frequently occur in our surroundings but are especially dangerous in hospitals where they can cause life threatening infections. Researchers have now aimed to address this problem by producing coatings for medical devices made from a cheap conducting plastic called PEDOT, which is what makes smartphone screens respond to touch. By applying a small voltage, the PEDOT surface was either flooded with electrons or left almost empty, which in turn affected the growth of Salmonella bacteria.

"When the bacteria land on a surface full of electrons, they cannot replicate," explains principal investigator Agneta Richter-Dahlfors, Professor at Karolinska Institutet's Department of Neuroscience and Director of the Swedish Medical Nanoscience Center. "They have nowhere to deposit their own electrons which they need to do in order to respire."

On the other hand, if the bacteria encountered an empty PEDOT surface, the opposite happened, as they grew to a thick biofilm.

"With the electrons being continually sucked out of the surface, bacteria could continually deposit their own electrons, giving them the energy they needed to grow quickly," says Professor Richter-Dahlfors.

This left the research team in a position where, at the flick of a switch, they could either abolish bacterial growth or let it continue more effectively. This has many implications for both health and industry.

"To begin with, we can coat medical devices with this material to make them more resistant to colonisation by bacteria," says Professor Richter-Dahlfors. "However, if we look to industries like wastewater management that need a lot of beneficial biofilms to create clean water, we can produce surfaces that will promote biofilm production," she continues.

In the future the research team will work to integrate this technology into devices that could one day be implanted into patients to keep them safe when undergoing medical procedures or having devices implanted.

**More information:** Salvador Gomez-Carretero et al. Redox-active conducting polymers modulate Salmonella biofilm formation by controlling availability of electron acceptors, *npj Biofilms and Microbiomes* (2017). DOI: 10.1038/s41522-017-0027-0

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