

Coating surfaces with a thin layer of copper has the potential to kill the virus causing COVID-19 faster

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Researchers have discovered that using a thin-film coating of copper or copper compounds on surfaces could enhance copper's ability to

inactivate or destroy the SARS-CoV-2 virus responsible for COVID-19.

In a study that began soon after the pandemic hit in March 2020, University of Waterloo engineering graduate students investigated how six different thin metal and oxide coatings interacted with HCoV-229E, a coronavirus that is genetically like SARS-CoV-2 but safer to work with.

"While there was already some data out there on the lifetime of the [virus](#) on common-touch surfaces like stainless steel, plastics and [copper](#), the lifetime of the virus on engineered coatings was less understood," said Kevin Mussleman, the Waterloo mechanical and mechatronics engineering professor who led the study.

The Waterloo team partnered with Wilfrid Laurier University researchers, who tested the effectiveness of the antiviral coatings on glass and N95 mask fabric.

Testing involved depositing coatings that were about 1,000 times thinner than a human hair, then immersing the coated glass and fabric in a viral solution or exposing them to smaller droplets of the viral solution. After removing the virus from the coatings, each extract was placed in contact with healthy cells and measured for its ability to replicate.

Results showed the other coatings did not have the same antiviral effects as copper or a copper-containing compound.

Additionally, they found that in some cases "nanoscale thin films of copper can come off from the surface and rapidly dissolve in virus-containing droplets, enhancing the virucidal effect," said lead study author Louis Delumeau, who recently graduated from Waterloo with a master's degree in nanotechnology engineering. "There is an opportunity to tailor the coating in a way that enhances its interaction with the viral droplet and the antiviral effect," added Musselman.

Coating could improve masks

While wearing a mask is an effective way of preventing the spread of COVID-19, Delumeau said adding an antiviral coating containing copper to the outside of the protective material or an inside filter could add an additional layer of safety.

"Not only would a mask that covers the nose and mouth greatly limit the transmission of the virus but adding a coating such as the one we developed could actually kill the virus rapidly and reduce the amount of virus spread," he said. The researchers' antiviral coating could also be applied to high-touch public surfaces, Delumeau said.

The Waterloo research group is developing [coating](#) techniques for masks and is continuing to explore the dissolution process for smaller droplet sizes, as well as investigating how to control the adhesion of copper films to various surfaces.

More information: Louis-Vincent Delumeau et al, Effectiveness of antiviral metal and metal oxide thin-film coatings against human coronavirus 229E, *APL Materials* (2021). [DOI: 10.1063/5.0056138](https://doi.org/10.1063/5.0056138)

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