

Cloth face masks that can be disinfected by sunlight

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During the COVID-19 pandemic, many people have become accustomed to wearing cotton face masks in public places. However, viruses and bacteria that stick to the mask could be transferred elsewhere

when the wearer removes or touches it. Now, researchers reporting in *ACS Applied Materials & Interfaces* have developed a special type of cotton face mask that kills up to 99.9999% of bacteria and viruses within 60 minutes of daylight exposure.

Face [masks](#) made of various cloth materials can filter nanoscale aerosol particles—such as those released by a cough or sneeze—potentially helping to reduce the spread of diseases, including COVID-19. But live bacteria and viruses on the surface of the mask could still be contagious. Peixin Tang, Gang Sun, Nitin Nitin and colleagues wanted to develop a new [cotton fabric](#) that would release [reactive oxygen species](#) (ROS) when exposed to daylight, killing microbes attached to the fabric's surfaces while being washable, reusable and safe for the wearer. Then, a person could disinfect their cloth mask during their lunch hour outside in the sun, or by spending a longer period of time under office or building lights, which are much less intense than sunlight.

The researchers made their antimicrobial fabrics by attaching positively charged chains of 2-diethylaminoethyl chloride (DEAE-Cl) to ordinary cotton. Then, they dyed the modified cotton in a solution of a negatively charged photosensitizer (a compound that releases ROS upon exposure to light), which attached to the DEAE chains by strong electrostatic interactions. The team found that a fabric made with a dye called rose Bengal as the photosensitizer killed 99.9999% of bacteria added to the fabric within 60 minutes of daylight exposure and inactivated 99.9999% of T7 bacteriophage—a virus thought to be more resistant to ROS than some coronaviruses—within 30 minutes. Further testing showed that the material could be handwashed at least 10 times and constantly exposed to daylight for at least 7 days without losing its antimicrobial activity. The fabric shows promise for making reusable, antibacterial/antiviral cloth face masks and protective suits, the researchers say.

More information: Peixin Tang et al. Daylight-Induced Antibacterial

and Antiviral Cotton Cloth for Offensive Personal Protection, *ACS Applied Materials & Interfaces* (2020). [DOI: 10.1021/acsami.0c15540](https://doi.org/10.1021/acsami.0c15540)

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