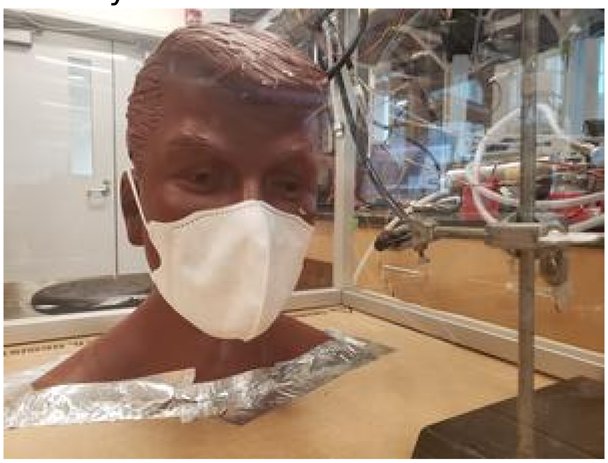
Face masks for all

UCI team unraveling how best to make do-it-yourself face masks to protect against coronavirus. Bandanas “more or less useless.”
Thursday, April 16, 2020
Lucas Joel
UCI Physical Sciences Communications


The head of a mannequin torso sits inside a Plexiglas box in Jim Smith’s lab, awaiting inhalation.

Picture Credit:
Jim Smith

The air that pours into your lungs when you breathe travels, on average, at about 10 centimeters a second. But it’s often not just air you’re breathing. There can be dust, pollen, soot and bacteria in air, and now, floating inside the droplets that people emit when they cough and sneeze and talk, there can be coronavirus.

“Even as much as singing and talking apparently has the capability of generating small particles that can be used as carriers for this virus,” says Jim Smith, an aerosol chemist in the Department of Chemistry who studies how things like dust and water droplets behave in the air.

Medical masks, Smith explains, can help stop these droplets. But with masks in such short supply that people are sewing their own, and with a raft of do-it-yourself mask-making videos emerging online, a team of UCI researchers led by Smith assembled to figure out how to make masks that are safe to use and that anyone can make at home. And things like bandanas — a common item people might use as a mask — are only effective at stopping the kinds of large droplets that emit when someone sneezes, Smith and his team found.

“Every day, I open up the news and I look and I see another story about masks, and about homemade masks, and about filtration in general, and I see a lot of misinformation about it,” says Smith, whose team will post the results of their findings alongside mask-making instructions on a new website.

The team applied for funding from the university to support the research. But, they’re getting to work before that funding arrives. “We couldn’t wait,” says Smith, whose aim is to use what he knows about aerosols to test how effective different kinds of household materials are at filtering out airborne particles like virus-laden water droplets. “I was so anxious to throw my hat in the ring,” Smith says. “I was keen to see if I could make some kind of difference.”

Now, in his lab in the basement of Rowland Hall, there are two figures: Smith, and what appears to be a man’s head locked inside a box made of Plexiglas. The head is that of a mannequin, which co-investigator Michael Kleinman in the School of Medicine delivered last week. Smith’s using the mannequin to simulate air flowing through the mannequin’s nose at the same average speed that we inhale air — about 10 centimeters a second. He straps everyday household fabrics like furnace filters, bedsheets, pillowcases and bandanas to the mannequin’s face, and after fitting a breathing tube in the mannequin’s throat, he injects particles into the box and measures the efficiency with which each material filters the particles. Smith uses a mannequin so he can mimic how air flows into the nose, and to make sure the masks he and his team devise will actually fit around a human face.

So far, they’ve tested more than 50 kinds of fabric. “What we’re trying to do is develop a simple-to-build mask design that does a really good job of filtering at the same time,” Smith says. “Our best luck has actually been using a furnace filter made of non-woven polypropylene that I pulled out of my garage and cut up.”

Smith cautions that not all fabrics you might find around the house are good options for a face mask. Some materials, including furnace filters made of Fiberglas, can send their fibers into a person’s lungs. “We want people to understand what is effective and what is not effective,” says Smith. “We feel like in the next week we’ll have all we need to have a design available.”

News Briefs
COVID-19
Chemistry
View PDF