Physicist creates N95-type respirators using cotton candy machine

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Mahesh Bandi, a physicist with the Nonlinear and Non-equilibrium Physics Unit, OIST Graduate University, Onna, Okinawa, has found a way to produce N95-type respirator filters that is less expensive and

quicker than conventional approaches. In his paper published in *Proceedings of the Royal Society A*, he describes the technique he developed and how well his filters performed.

As the pandemic has worn on, scientists have found that mask wearing can reduce the spread of COVID-19. Unfortunately, cloth masks are far from foolproof. Research has shown that to prevent infection, people need to wear an N95 respirator—a face mask that has electrocharged filters that attract and hold viruses, preventing them from passing through. Such respirators are expensive, difficult to manufacture and are in short supply. In this new effort, Bandi has found a way to make a filter as effective as those used in N95 respirators but that can be produced quickly and cheaply.

The technique involves heating ordinary plastics such as bottles or shopping bags and then putting them into an ordinary cotton candy machine (also known as a candy floss machine). The machine spins the plastic into a material that is similar to cotton candy (a mesh), which is also electrocharged by the spinning. Bandi then cuts the resulting material into small squares and then bolsters their electrostatic charge by placing them close to the vent of a common air ionizer.

Bandi tested his filters by placing several inside of surgical masks. He found the filters worked very well, but the masks were not a viable option. He then designed his own mask to allow easy insertion and removal of the filters (each mask requires three) and used a 3-D printer to produce the result. Rigorous testing (which included microscopic inspections and comparisons with N95 filters) showed the filters to be as effective at preventing inhalation of SARS-CoV-2 viruses as standard N95-type respirators.

Bandi does not say if he has plans to set up manufacturing centers for the masks—it appears he is simply publishing the idea as a way to allow

others to do so.

More information: M. M. Bandi. Electrocharged facepiece respirator fabrics using common materials, *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences* (2020). DOI: 10.1098/rspa.2020.0469