AFS AMERICAN FILTRATION & SEPARATIONS SOCIETY FALL VIRTUAL CONFERENCE

S1.2: Alternative Face Masks Made of Common Materials for General Public

Qisheng Ou
University of Minnesota

Co-Authors:
Chenxing Pei, Seong Chan Kim, David Pui – University of Minnesota

ABSTRACT

As COVID-19 pandemic has caused more than 23 million confirmed cases globally (as of August 25th, 2020), it is critical to slow down the spreading of SARS-CoV-2 to protect the healthcare system from overload. Wearing a respirator or a mask has been proven as an effective method to protect both the wearer and others, but commercially available respirators and masks should be reserved for healthcare workers under a currently desperate shortage. The use of alternative materials becomes an option for the general public to make the do-it-yourself (DIY) masks, with their efficacy seldom reported. In this study, we tested commercial respirators and masks, furnace filters, vacuum cleaner filters, and common household materials. We evaluated the materials' fractional filtration efficiency and breathing resistance, which are primary factors affecting respiratory protection. To compare the efficiency-resistance tradeoff, the figure of merit of each tested common material was also calculated. Filter media with electrostatic charges (electret) is recommended due to its high efficiency with low flow resistance; multiple-layer household fabrics and sterilization wraps are acceptable materials; a coffee filter is inadvisable due to its low efficiency. The outcome of this study can not only offer guidance for the general public under the current pandemic but also suggest the appropriate alternative respiratory protection materials under heavy air pollution episodes.