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Interchangeable filter characterization for COVID-19 protection TANYA PURWAR, ANTONIO ESQUIVEL, VENKATESH PULLETIKURTHI, LUCIANO CASTILLO, Purdue University, VICTOR CASTANO, Universidad Nacional Autnoma de Mxico — We have proposed a novel interchangeable filter for masks to curb the spread of respiratory viruses. The multi-layer filter holds novelty in its layers: layer A hydrophobic lipophobic layer (using nano-engineered, halogen-free, super omni-phobic coatings), layer B DLC coated copper layer, and layer C which is a non-woven layer. The varying fiber arrangement of layer C along with the droplet resistant layer A, and pathogen fighting layer B, makes it an efficient filter in comparison to N-95 and surgical masks, as suggested from our preliminary experimental results. We have characterized the filter through experiments and simulations, where the experiments include flow visualization of the saliva particle flow, and measurements using optical particle counter in order to determine the qualitative and quantitative efficiency of the filter. We measured the pressure drop vs velocity across the filter, used for determining the viscous and inertia resistance coefficients, crucial in verification of the simulations and pressure drop across filter. We used ANSYS FLUENT discrete phase model to simulate the flow through the filter and modeled filter as porous media. This helps us shed light on how the proposed filter can prevent and inactivate the nanoscale pathogens.

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