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Title: **Solid State Electric Field Air Filter for Face Masks**

The current health emergency was caused by coronavirus, SARS-COV-2, that's believed to be transmitted with preponderance through aerosolized virions. For the medical personnel and for the public at large, the use of effective and safe face masks is part of the arsenal of measures that can limit the spread of the respiratory disease known as COVID-19.

Thus, there is a critical need for a filtration device able to retain or deactivate all biological agents irrespective of size, that should be reliable, mechanically robust and reusable for hundreds or thousands of times after simple cleaning, while the fabrication process should be capable of producing large numbers of such filtering elements, fast, at low cost and using pre-installed technology in U.S. based facilities.

Towards addressing this need, this project proposes the use of high intensity electric fields to inactivate the virus. This new approach uses the interaction between an external electric field and the field produced by the uneven electron density of the molecules that makeup the viral envelope. The design of the filter cartridge allows the generation of extremely intense electric fields of up to 4.5 MV/m. The operation of such a device while able to destroy viral particles will not endanger the safety of the user. The interaction primarily enables the disruption of the molecular integrity leading to the impairment of the viral ability to connect to the cellular membrane and infect. The main objective of this proposal is to fabricate and test an electrostatic air filter that can be integrated with commercially available respirators and face masks that are suitable for personnel exposed to biological agents.