

## Supporting information

for

### **Engineered Electrically Heatable Face Masks for Direct Inactivation of Aerosolized Viruses on the Mask Surfaces**

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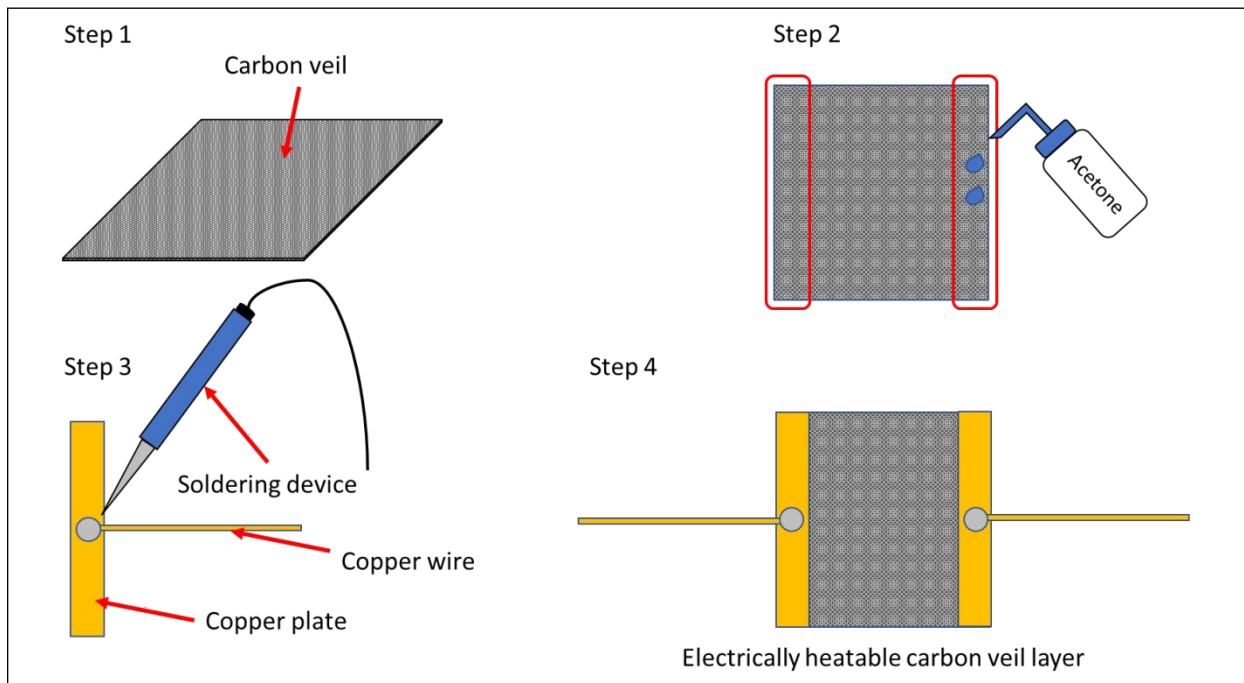
\* Corresponding authors: Dr. Vesselin N. Shanov ([shanovvn@ucmail.uc.edu](mailto:shanovvn@ucmail.uc.edu)), Dr. Hodon Ryu ([ryu.hodon@epa.gov](mailto:ryu.hodon@epa.gov)), and Dr. Soryong Chae ([chaesg@ucmail.uc.edu](mailto:chaesg@ucmail.uc.edu))

**Table S1.** Log-inactivation efficiency at various Joule heating temperatures (duplicated)

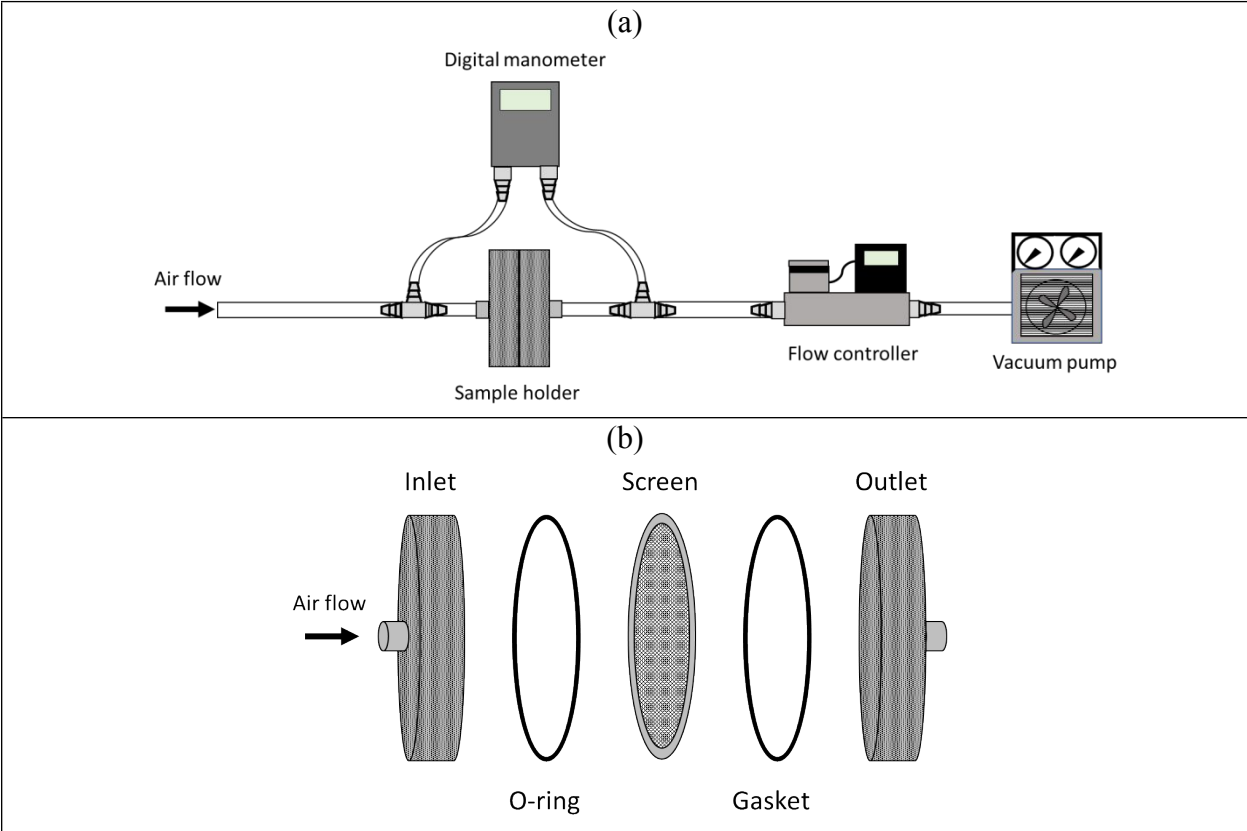
Joule heating temperature (°C)	70	80	90
Joule heating time (mins)	5		
Log-inactivation value	$3.2 \pm 0.72$	$2.0 \pm 0.06$	$2.6 \pm 0.12$

**Table S2.** Log-inactivation efficiency at various Joule heating times (duplicated)

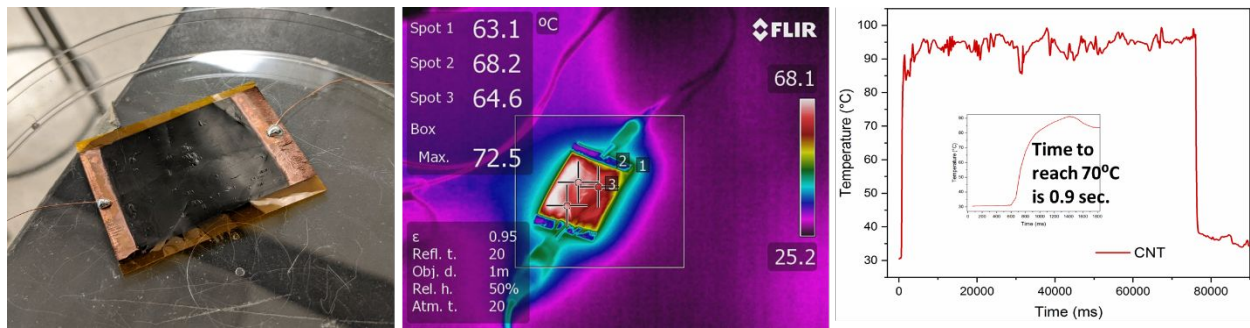
Joule heating temperature (°C)	70		
Joule heating time (mins)	5	10	15
Log-inactivation value	$3.6 \pm 0.09$	$2.7 \pm 0.08$	$3.5 \pm 1.14$



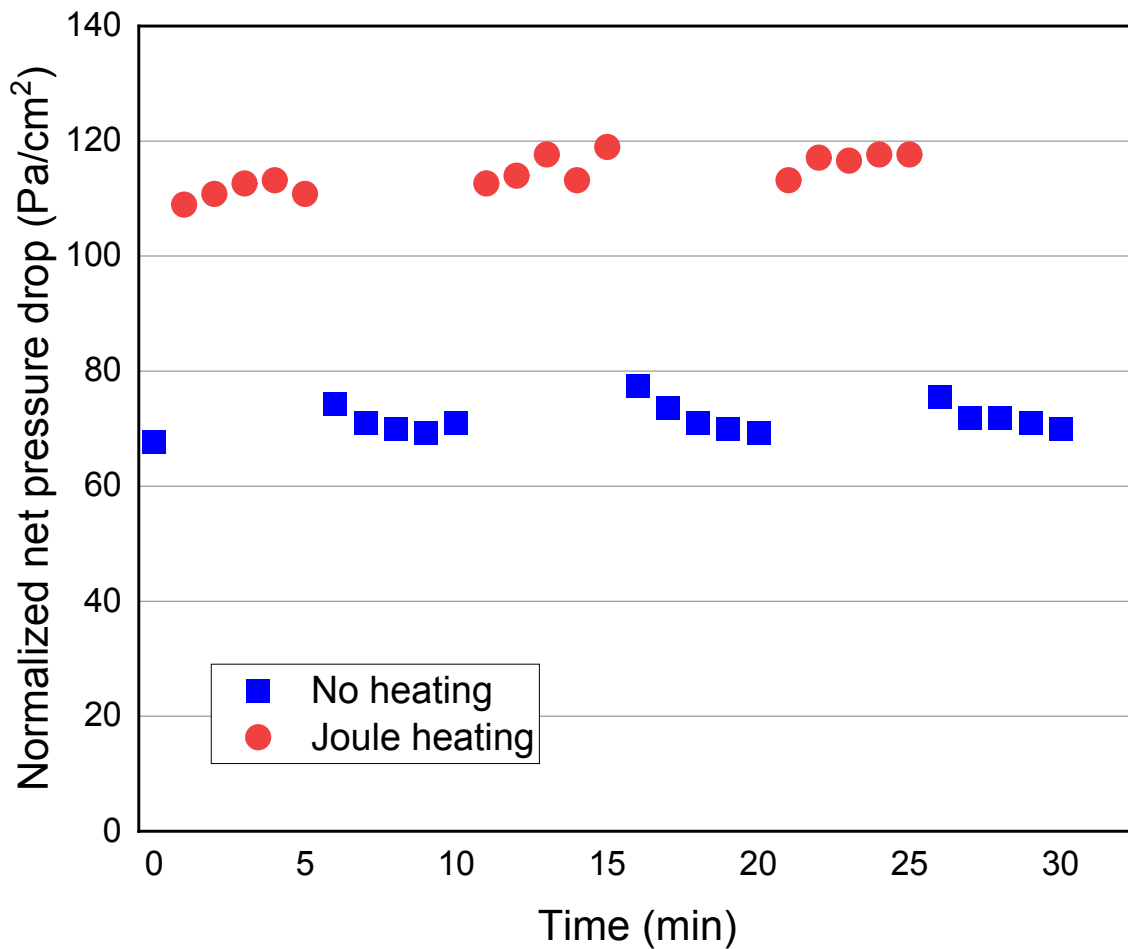
**Figure S1.** Fabrication procedures of an electrically heatable carbon veil (CV) layer. Step 1 involves preparing a carbon veil layer (7.5 cm by 7.5 cm). Step 2 includes a removal process of the polymer binders from the carbon veil layer using acetone. The copper wires (7.5 cm long each) are soldered on both copper electrodes (1 cm by 7.5 cm) in Step 3. Soldered electrodes are attached to the carbon veil layer using conductive silver paint in Step 4.



**Figure S2.** Illustration of pressure drop measurement system. (a) schematic diagram of the system to measure pressure drop of ASTM level 3 mask. (b) components of the sample holder.



**Figure S3.** Picture of a 3 cm x 4 cm CNT sheet consisted of 100-layer with Cu electro-deposit electrodes. And extending wires soldered at the 2 Cu electrodes-(left); Uniform temperature distribution on the surface of the CNT heaters obtained by an infrared camera-(middle); The average value of the temperature elevated with time on the surface of the CNT sheet heater from the moment it is turned on-(right).



**Figure S4.** Normalized net pressure drops of a commercial ASTM level 3 mask with a CV layer without (red) and with Joule heating (blue) generating surface temperature of 65 °C. Effective surface area = 3.8 cm<sup>2</sup>. Air flow = 6.2 L/min. Initial normalized net pressure drop at 24.2 °C (room temperature) = 67.6 Pa/cm<sup>2</sup>.