



USC University of
Southern California



Reusable Filtered Mask

April 20th, 2020

Darryl H. Hwang, PhD

Assistant Professor of Research
Department of Radiology, Keck School of Medicine
Department of Biomedical Engineering, Viterbi School of Engineering
Director, 4D Quantitative Imaging Lab, Keck Medical Center of USC

Guidance



In settings where facemasks are not available, HCP might use homemade masks (e.g., bandana, scarf) for care of patients with COVID-19 as a last resort.

-Centers for Disease Control and Prevention

Timeline



- 3/22/2020 Joe Savoie, Director of Imaging Services, texts 3D printed mask
- 3/23/2020 Prototype printed over night
- 3/24/2020 Meeting with Infection Prevention
- 3/25/2020 Fit test with Respiratory Support
Asked Facebook to for people with 3D printers
- 3/26/2020 Connect groups in LA on getting masks made
 - CRASH Space - <https://blog.crashspace.org/>
 - Sunweaver Creative
 - Trojan Family
 - Iovine and Young Academy
 - USC School of Architecture
 - USC School of Engineering

Reusable Filtered Mask



Reusable

- Can be sanitized in a hospital setting

Filtered

- Has to be able to provide filtration comparable to N95 or better

Mask

- Must be able to fit on the face of the healthcare worker

Disinfection



1.4%
Hydrogen
Peroxide



THE UV Box
UV 254 nm
germicidal
wavelength



Pulsed Xenon
Robot
UV
Disinfection

Filter Material



- We are not creating our own filter material.
- We are assessing different material for efficacy and ease of installation
- We are looking to partner with laboratories to quantitatively test filter materials.

Filter Material



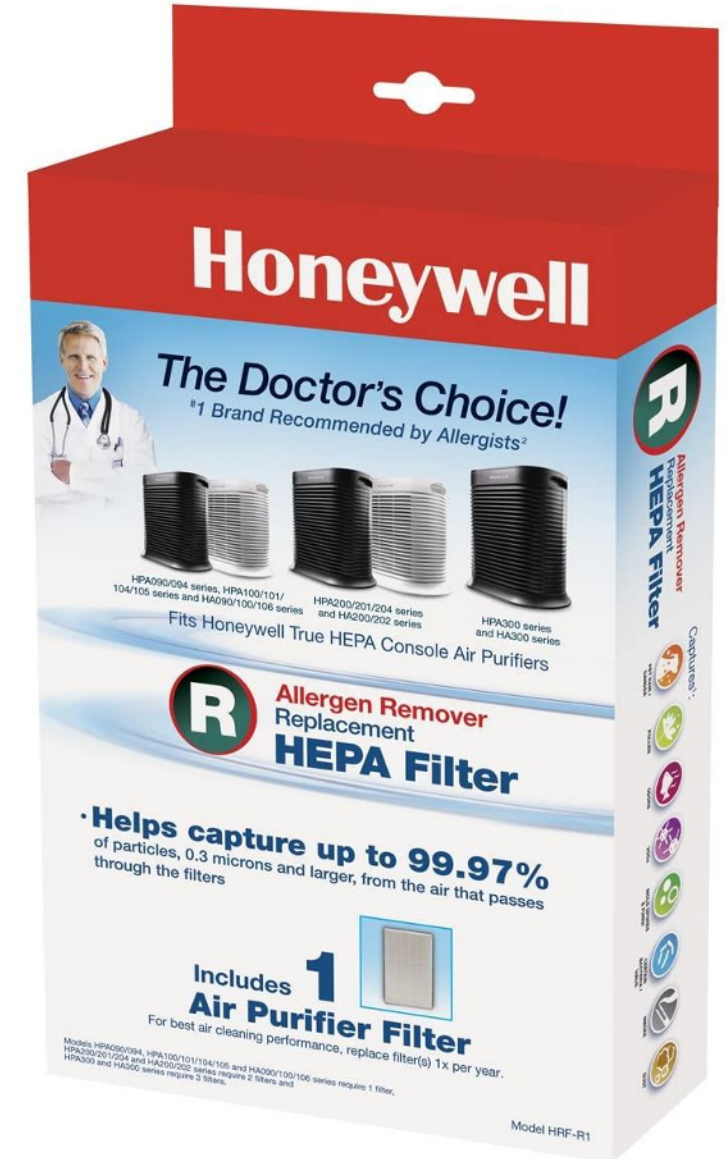
Required Criteria:

- Needs to be MERV 16 or better
- Must not have fiberglass

Nice to have:

- Easy to adapt

Honeywell HEPA Filter
Model: HRF-R1



3D Printed Mask



Finishing the Mask



Finished Mask



3D Printed Mask



Reusable Filtered Mask



For more information:

<https://keckmedicine.org/covid/ppe>

FIGHT ON!