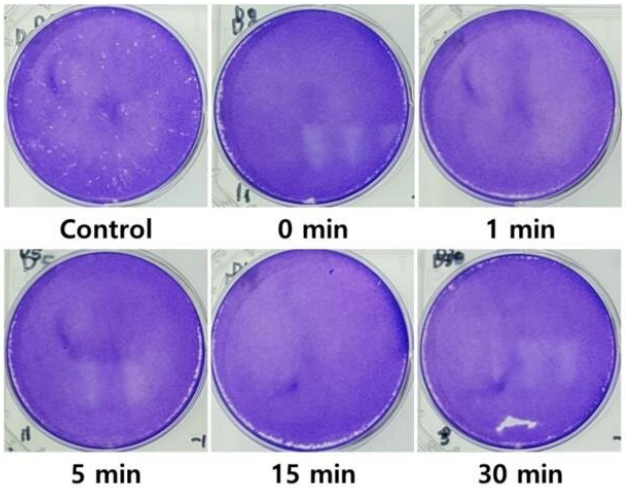
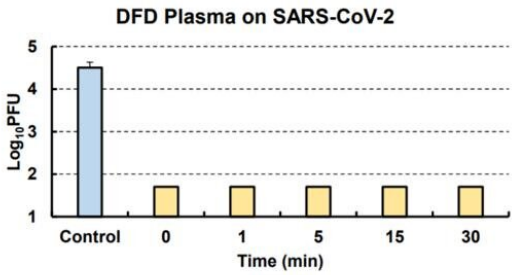
Disinfecting COVID-19 with a plasma filter

March 2 2022



	PFU	Log10
Control	3.19 X 10^4	4.504±0.127
0 min	5.00 X 10^1(detection limit)	1.699
1 min	5.00 X 10^1(detection limit)	1.699
5 min	5.00 X 10^1(detection limit)	1.699
15 min	5.00 X 10^1(detection limit)	1.699
30 min	5.00 X 10^1(detection limit)	1.699



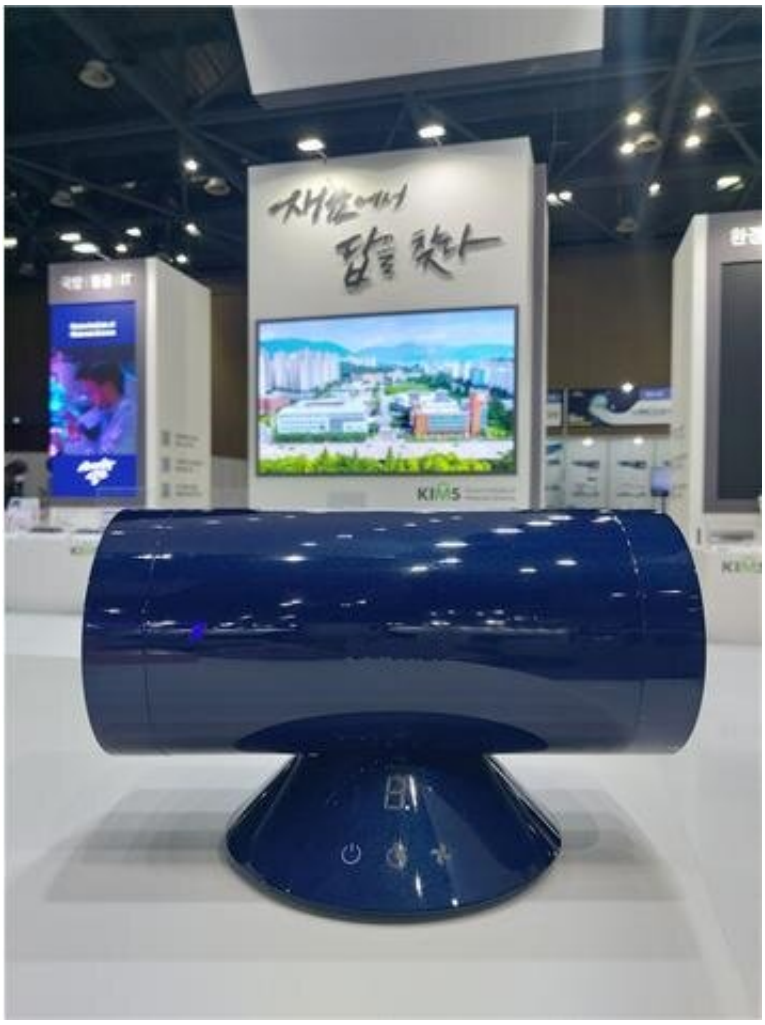
Experiment of real time coronavirus inactivation through joint research between KIMS and Masan National Tuberculosis Hospital (PFU decreasing tendency by accumulated time after passing through plasma filter). Credit: Korea Institute of Materials Science (KIMS)

A research team led by Dr. Seunghun Lee of the Department of Nano-Bio Convergence at the Korea Institute of Materials Science (KIMS) developed a plasma air conditioning technology that can inactivate the SARS-CoV-2 in real time. The technology verified the real-time virus inactivation in an aerosol which is main infection vector of the COVID-19.

The plasma filter developed by the research team uses dielectric filter discharge technology to inactivate the coronavirus aerosol with reactive oxygen species. The research team confirmed that the coronavirus was inactivated by about 99.8% or more immediately after passing through the plasma filter. The plasma filter uses catalyst materials for ozone removal that can be applied to air purifiers and air conditioning equipment. In addition, the research team installed a catalyst at the rear end of the plasma filter to maintain the concentration of emitted ozone below 0.05 ppm. The catalyst solved the ozone emission problem, a weakness of plasma technology, and satisfied various standards related to ozone emission.

Previous experiments were conducted in a liquid form in a petri dish, not in the form of an aerosol. Due to the dangers of high-risk viral aerosol experiments, it has been difficult to directly verify the inactivation of aerosolized coronavirus.

The research team developed an experimental device that can directly evaluate the virus inactivation performance by spraying the aerosol of the coronavirus culture medium. The research on the evaluation of plasma filter performance has been submitted to international journals. If the technology is applied to air purifiers and air conditioning equipment of medical facilities and multi-use facilities, it could suppress the spread of infectious diseases.



Air sterilization device manufactured by a company received technology transfer. Credit: Korea Institute of Materials Science (KIMS)

Dr. Seunghun Lee, the lead researcher and a senior researcher at KIMS, said, "Developing various disinfection materials and parts is important, but there are insufficient empirical studies using aerosols of a highly pathogenic virus. By utilizing the inactivation data of the coronavirus aerosol obtained in this study and predicting the performance of bio-aerosol removal in a virtual space using digital twin, we plan to conduct follow-up studies to calculate the processing time and optimal arrangement required for disinfection of multi-use facilities."

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