

## Nanotechnology-enabled N95 Masks Can Halt the Spread of Coronavirus

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These days all of us are worried about coronavirus and try our very best to protect ourselves in as many ways as we hear may actually work; wearing N95 masks designed based on nanofiber technology is one of the ways that is reported to be highly effective.

As the Wuhan coronavirus continues to claim lives in almost every country of the world, especially in [China](#), where it first originated, the officials of this country strongly urge people to wear face masks in public to stem the outbreak of this lethal virus.

But a key question many people are these days asking is “Can wearing a regular surgical face mask protect you against coronavirus?” The answer is “No.” To make sure you do not catch the virus, you should wear a more specialized face mask, known as an N95 respirator.

Respirators are a particular type of personal protective equipment designed to reduce the respiratory exposure of the wearer to dangerous substances such as toxic chemicals or infectious particles. What all types of these personal air purifiers have in common are the filters specifically tailored for use in different environments.

[Nanofibers](#) are the perfect filter material for use in N95 respirators, which not only do provide a very large specific surface area, but can also be functionalized with various chemically active groups to improve the efficiency of the respirator in capturing naturally occurring nanoparticles (e.g., viruses), micron-sized particles (e.g., bacteria), and man-made particles (e.g., soot from diesel exhaust).

Several methods are available for nanofiber production, such as conjugate spinning, chemical vapor deposition, phase separation, drawing, self-assembly, melt-blowing, and electrospinning; among which electrospinning is a widely used technique for fabricating air filter media, because electrospun nanofibers have an average specific surface area of 1000 times higher than microfibers, along with an average pore size of 4 to 100 times smaller than

microfiber membranes. Hence, an electrospun nanofiber membrane has a remarkably higher capturing efficiency than a microfiber membrane, making a perfect filter for N95 respirators.

### Nanotechnology in Battle Against Coronavirus ...

It should be noted that N95 respirators are NOT resistant to oil and do NOT provide protection against oil-containing solid or liquid aerosol particulates. But, the good news is that there is not any oil involved in the spread of coronavirus, and if worn correctly, these masks can block out at least 95 percent of the airborne particles larger than 2.5 microns, including particles or droplets carrying viruses and bacteria; thus, protecting the wearer against respiratory tract infections and diseases. Another benefit of these respirators is having a non-specific service life, which means they can be used as long as they are not damaged or breathing resistances are not detected.

One of the few countries that have the technology to produce N95 masks is [Iran](#). Back in 2011, when Iranian experts were working on establishing the production line of these respirators, European companies refused to sell the nanofiber production equipment to this country due to the sanctions, but the experts used domestic technology and produced the equipment with such quality that a Korean company, recently, preferred to buy it from [Iran](#) for €350,000 rather than from Europe for 1€ million. A number of European companies have also placed orders for this Iranian-made equipment.

Up until now, [China](#) has ordered 10 pieces of this nanofiber production equipment from the [Iran](#)-based company of [Fanavaran Nano-Meghyas](#), 7 of which have already been delivered and installed in this country. Apart from the nanofiber production equipment, [Iran](#) has also received orders for a total of 2 million N95 respirators from different countries of the world owing to the ongoing coronavirus outbreak.

Given the current extraordinary circumstances in [China](#) which led to people stockpiling these masks to protect themselves and depleting all the store shelves across the country, [Iran](#), along with [Turkey](#), supplies N95 respirators to this country to win the battle against this horrendous virus.

