As the name suggests, microfibre cloths are made up of microscopic fibres, the thickness of which is less than 1 micrometre (µm). These cloths are made up of synthetic fibres typically measuring 300 nanometres in thickness comprising of polyester and polyamide, 50% each. In addition, these fibres have nanoscale tiny grooves or slits, each less than 100 nm in width.

Owing to their microscopic structure, these cloths are excellent at picking up dirt. Thanks to the fact that these microfibre cloths are oftentimes included while purchasing mobile phones, cameras, LED TVs and so on to clean the lenses and screen surfaces, these cloths are readily available in the households. Microfibre cloths are quite inexpensive as well and can be reused after washing as many times as one likes.

Compare microfibre cloths with cotton fabric. Cotton clothes are made up of natural cellulose fibres with a thickness between 11,000 to 22,000 nm. In addition, cellulose fibres are smooth, devoid of any grooves or slits.

Microfibre cloths are so efficient in picking up the microscopic dust particles because they leverage the van der Waal’s forces, named after its discoverer, Johannes Diderik van der Waal, 1910 Nobel laureate from Leiden, the Netherlands. These forces are weak short-range electrostatic adhesive forces utilising dipole-dipole interactions of charged molecules (one can say it is like “magnetism at a molecular level”). Remember that the same van der Waal’s forces help the lizard (gecko) to walk on any surfaces, as the foot of the lizards is comprised of superfine spatula-shaped bristles called setae, each measuring mere 200 nm in thickness. Lizard’s setae have inspired nanotechnology scientists to design a host of synthetic materials to utilise the van der Waal’s forces, including self-adhesive sticky notes like Post-It, sticky reusable tapes like Scotch, dry erase markers, dry glues like Sugru, and so on. Such a nature-inspired design of synthetic materials (mimicking the biology) is what is known as biomimetics.

Microfibre cloths are excellent examples of biomimetics; the fibres mimic setae of lizards to utilise the van der Waal’s forces to pick up the dirt. The nanoscale grooves also aid in picking up ultrafine dust particles, rendering them a good choice for cleaning a large number of surfaces. In addition, these clothes do not demand any expensive cleaning solutions.
to get the jobs done; spraying the surface with plain tap water would suffice.

There are at least two peer-reviewed studies that assessed virus-removing potentials of microfibre clothes in comparison with that of other materials. In a 2012 study, published in *Applied Environmental Microbiology* by a team from the US, the microfibre clothes were found to be significantly more effective in removing virus particles compared with a terry towel. In a 2013 study published in *Journal of Food Protection*, a group of Finnish scientists from the University of Helsinki compared the efficacy of four cloth materials to remove viruses from a range of surfaces, including latex, plastic, stainless steel and cucumber. The study found microfibre clothes as significantly more effective than the rest.

The tiny grooves in the microfibre cloths make them excellent materials for making homemade masks. The pore-size of industry-standard N-95 masks – currently the top choice by medical professionals – is 300 nm. However, note that the size of the 2019 SARS nCov-2 (the novel Coronavirus) is 50–200 nm.

Theoretically, the infectious virus particles can pass through these pores. Think of a fishing net with net size a bit too large such that the fish can pass through; such nets hardly do the job. Current data suggest that most of the community transmission of Coronavirus happens through sneeze. Sneeze produces a superfast jet of fine mist called aerosol consisting of ultrafine droplets. The majority of these tiny droplets are around 300 nm in diameter. As the pore size of N-95 masks is 300 nm, these masks indeed help to minimize the community transmission of Coronavirus infections. However, due to large scale demand, these masks are currently not available in the market.

How about regular home-made masks made out of cotton clothes? Remember that cellulose has around 20,000 nm thickness, so the pore size would naturally be too large for all kinds of microbes to pass through, including much larger bacteria. Additionally, the fibres are smooth to trap any minute particles. While wearing cotton masks is better than nothing at all as it can prevent constant touching of the face with your hands, these masks might not be of much help to control the COVID-19 community transmission.

Making a microfibre mask is simple, just substitute the cotton fabric with a microfibre cloth. There are two kinds of microfibers available in the market; split and non-split. Split microfibre clothes are the ones meant for general cleaning, while the non-split clothes are softer and meant to be used as a towel as they can absorb a large amount of water (6 to 8 times their weight!). For mask making, split microfibre is better than non-split because it has nanoscale grooves that can trap the virus particles. I use neatly folded microfibre cloth as an insert for my regular cycling mask scaffold, instead of disposable filters. One can also follow the CDC’s method of making homemade masks with just a piece of cloth and two rubber bands. I also suggest having a layer of cotton inside the mask such that the skin is in touch with cotton instead of microfibre to minimise the irritation.

As much as a great virus trapper, these microfibre cloths are too good to carry the viruses around if proper care is not exercised, as in the case of N-95 masks. Make sure that after each use the mask is not touched with bare hands; if at all the mask is touched, make sure to wash your hands properly. Studies have shown that 15 minutes of steaming kills the virus particles. Machine-washing the masks using mild detergents is preferable over hand washing. Make sure not to use bleach or fabric softener or heat, as these would inactivate the much-needed van der waal’s forces, effectively rendering the masks useless. In case you have no washing machines, hand washing is fine, but make sure not to excessively use the detergent, as the detergent particles can get trapped inside the masks. Mild liquid detergent is suggested, and make sure to rinse it at least five times in freshwater, before sun-drying completely.

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