



Contemporary Idea of Special Uniforms for School Going Students for Protection from COVID-19 During a Pandemic

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Abstract

The existent manifestation of corona virus (COVID-19) has turned into a rampant. Consequently, a lockdown was imposed as an emergency situation starting from December 2019. To avoid contamination of this COVID-19 virus schools were instructed to shut down fully or partially. Which caused the students to pause their studies for quite a time and then they became accustomed to online education. Considering the uncertainty and long-term effect of COVID-19, scientists, engineers, physicians, and researchers have been trying to utilize their full-fledged intellect and many of their efforts have already been fruitful. With this keep in mind that our study reveals an idea of introducing a special uniform for school students, which would be a great innovation during this COVID era. In this paper, we also point out introducing mask intercepted Nano motor and Nano fan to ensure oxygen supply inside the mask. An idea was proposed to apply virus protective finish which has to be made from Nano finishing material as like as a smart Textile to protect students from corona virus.

Keywords: New Normal, Digital Knowledge, Water Proof Breathable Fabric, Nano Motor, Special School Uniform, COVID-19.

1. Introduction

The Previous pandemic of 21st century was the Swine Flu in 2009 which caused 700,000 people death. Also, centuries before corona virus, plague, smallpox, yellow fever, and other infectious diseases caused the death of hundreds of millions all over the world [1].

1.1. Motivation

At the end of 2019, COVID-19 has spread throughout the world in an epidemic form and a lockdown was ascribed as a quandary situation in March 2020. As it's an infectious disease, all schools and other government and non-government institutions were instructed to shut down for a while which now continuing for a long time. Later on, the confinement started to baffle the active wheels of trade, commerce, and the industry as well as different service sectors. People have been requested to maintain social distancing to control spreading of corona virus.

But, obviously, the social distancing did not create a barrier as a whole. People habituated themselves in this unusual but 'new normal' online world. More or less every sector i.e., education, research, medical treatment, laws, administration, and trade commerce have been embracing this new digital knowledge. Considering the uncertainty and long-term effect of Covid-19; researchers have been trying to figure out how to cope up with the current situation and many of their efforts have been already avowed as fructuous. Hence the results of the research would become more effective and mobilized if the collected data and theoretical analysis could be shared mutually among the researchers. This combined research is significant for the present COVID-19 world and thereafter. This combined dispersion of research as well as knowledge would undoubtedly be conducive for both the educators and the industry.

From the very eve of COVID-19 escalation, the educational institutions were instructed to shut down immediately. To avoid frequent contamination especially both the physical and mental health of children, different countries of the world were bound to take this kind of decision considering the great uncertainty and delusion ahead.

1.2. Aim

On the other hand, the worldwide administration considered it ‘risky’ to keep all educational institutions open during this course of time. That is why in numerous countries, authorities instructed to shut them off even after reopening. For facing this uncertain situation schools have started, online classes. Though it’s a temporary solution for this incertitude situation. So, in order to overcome the following crisis, we started thinking about launching a special institutional uniform which basically refers to school.

The term ‘Special uniform’ refers to a product that enhances the special activity and usefulness of common fabrics. In this special uniform, students are advised to wear scarf instead of ties. A specially designed long scarf would be helpful to protect their nose and mouth. At the same time, they could add a powerless lens, spectacle to protect their face and eyes.

To produce a face mask, virus protective fabric should be used along with the adding of Nano motor and Nano fan in order to supply sufficient oxygen inside the mask because it is more effective supplying air directly into the mask. In this way, a direct air supply can be avoided. Adding Nano motor and Nano fan are termed as ‘Smart Textile’.

In the case of the most contagious place, a big shield like G-suit should be used. To receive the best result a fan along with a transparent face shield made from Nano fibre is advised to use. Structure and dissemination of Corona virus: corona virus is the term for RNA virus which is an infectious disease in the human body [4].

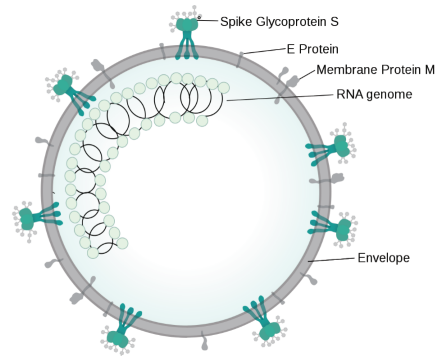


Figure 1 (a). Structure of corona virus.

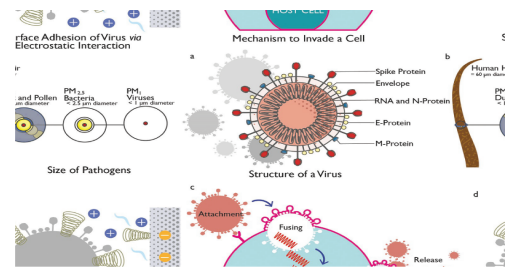


Figure 1 (b). Mechanism to enter cell through corona virus.

The virus which causes COVID-19 is mainly passed through droplets which originates when a transited person coughs, sneezes, or exhales. These droplets are too heavy to float in the air, and quickly drop on the ground or objects [5]. The virus is a tiny contagious factor that is 100 times tinier than the average bacteria and can be observed by utilizing an electron microscope. When a virus is transmitted to a cell it begins to recreate and generate virions quickly (Figure 1b). As a consequence, it starts to produce more infectious material than its original material and spread from person to person [6].

The dissemination of liquid through fabric could be introduced in two ways: penetration and permeation. Penetration relates to the flow of gas, vapor, and liquid through a porous material. On the other hand, permeation relates to the transmission of gas on vapor through the porous material. But pathogens are larger than gas and vapor molecule which interfere to not permeate through fabric [7]. And the corona virus which is responsible for COVID-19 has been gone through aerosols [8]. During this pandemic COVID-19 global school

closure represents an innumerable risk to children’s education protection and wellbeing. The UN Secretary General António Guterres currently called upon governments and donors to give importance to education for all children and the global coalition was established to support in facilitating the re-opening of schools.

But in order to keep school re-opening safe and sound with each country’s overall COVID-19 health response along with all reasonable measures taken by introducing special uniform which will protect the students from this infectious disease [9].

2. Discussion

2.1. Fabrication Techniques

Special uniform should be full sleeve for both summer and winter seasons. And for this some methods are incorporated-

- For manufacturing this water proof breathable fabric (Organic cotton) should be used for making body fabric
- Also add powerless spectacle to protect their face and eyes.
- During manufacturing also keep in fabric comfort ability.
- Then virus protective finish has to be done from Nano finish material in term of smart textile.
- In this uniform, scarf should be used instead of ties same as body fabric to protect nose and mouth.

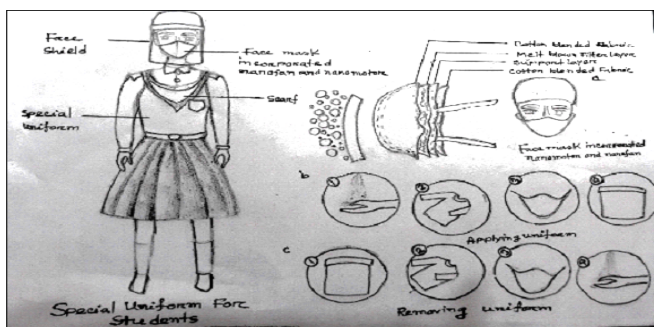


Figure 2. Schematic design of the special uniform for students.

2.2. Nano Finish Material

Nano Technology improves existing function and performance of fabric which develops smart textile with completely new features. During the Finishing

of the special uniform with Nano finishing material, silver Nano particle-based microcapsule which is treated through yarn and showed effective antimicrobial activity against bacteria, fungi, Escherichia coli, Citrobacter, bacillus subtilis.

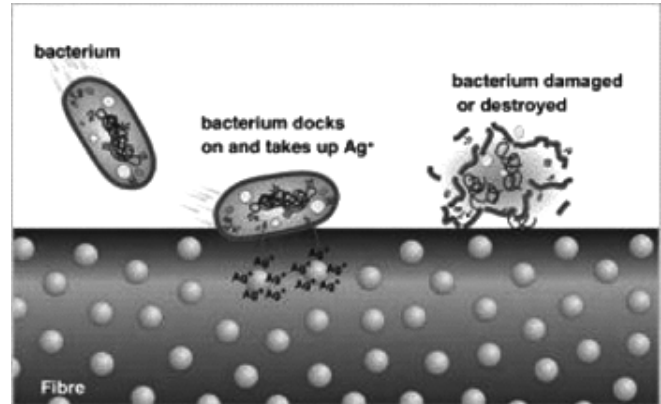


Figure 3. Fibre treated with silver Nano particle.

2.3. Odor Finish in Uniform

Microencapsulation is one of the current technologies which is used to remove odor from garments. Microencapsulated material anchored into the fibre when the wearer moves the particles become active and begin to exempt active ingredient which releases moisture, aloe, vitamin E, Therapeutic smell and insect's repellent to odor.

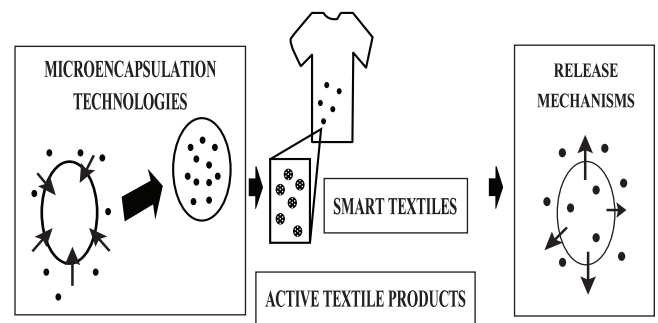


Figure 4. Microencapsulation procedure in uniform.

2.4. Incorporating Nano motor and Nano Fan into Face mask

Integration of Nano motor and Nano fan into mask during fabric manufacturing process is summarized in Figure 4. The Nano devices could be integrated into yarn directly and it wouldn't be an obstacle with the normal production process of the fabric.

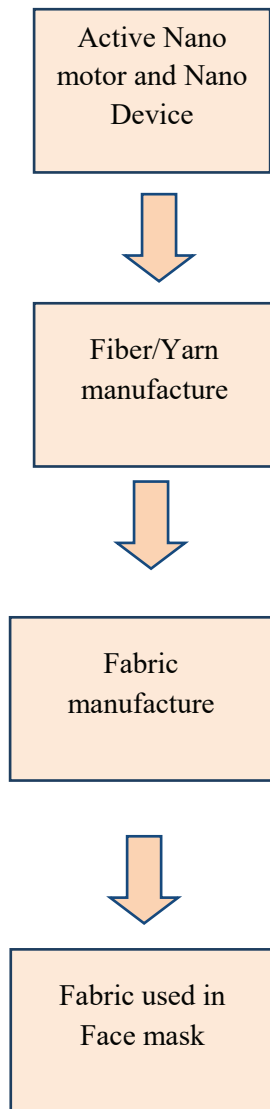


Figure 5. Stages in integrated Nano motor and Nano fan into fabric.

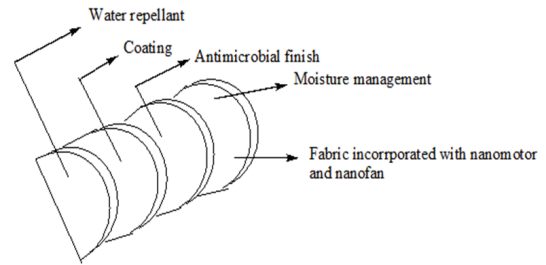


Figure 6. The layers of face mask.



2.5 Comparative study of face mask

Table 1. Different types of face masks and their features.

Mask Type	Following Fabric	Characteristic
Telephone mouth piece mask [10].	Synthetic polymer (polyolefin fiber) and electret treated nonwoven web (meltdown web).	The mask is coated with pressure sensitive adhesive which transforms sound to electricity so that outer layer of the mask electret and following viral particle can be annihilated.
Multilayer composition for a breathing mask [11].	Spun bonded non-woven fabric, felt type turbocharged nonwoven fabrics, a ply of melt blown microfiber.	First layer of felt-type tribo-charged nonwoven fabric on the basis of different types of fibers compatible for giving the fabric opposite electric charges that increases the filtration.
Mask using frictional and static electricity [12].	Polymer, nylon, cotton, silicon-based polymer, polypropylene (PE), polyethylene terephthalate (PET).	The mask is based on specific country with certain weather situation to prevent from fine and yellow dust and are not used second time.
Masks that use electrostatics materials to protect healthy individuals from COVID 19[13].	Nylon cloth sandwiched between polypropylene layers.	By Producing static electricity this mask is enabled to absorb viral materials which needs a low pressure of following breath.
Aerosol Filtration Efficiency of Common Fabrics Used in Respiratory Cloth Masks [14].	Cotton–silk, cotton–chiffon, cotton–flannel	The following mask layers are specifically useful at excruding materials in terms of Nano scale state.
Self-powered electrostatic adsorption face mask based on a triboelectric Nano generator [15].	Poly (vinylidene fluoride) electro spun Nano fiber film (PVDF-ESNF).	The following particles on mask are electrostatically absorbed by PVDF-ESNF and also during respiration it gives electrostatic charges.
Washable Multilayer Triboelectric Air Filter for Efficient Particulate Matter PM2.5Removal[16]	Polytetrafluoroethylene (PTFE) and nylon fabrics.	By utilizing linear motor it develops charges to enhance the functionality of mask which involves triboelectric air filter to separate particulate matter (PM).
Mask Incorporated with Nano fan and Nano motor.	Cotton blend Fabrics high thread count combined with high electrostatic Fabric (600 thread count)	Design of this mask ensures antistatic moisture, anti-fungal, exceptionally durable, barrier against pathogen particles and oxygen supply inside the mask.



3. Conclusion

The crisis of COVID-19 still goes on. So in these circumstances to re-open schooling is a tough decision but using this kind of special uniform will reduce the possibility of affected students and also this will give the students courage to face the current pandemic situation. This uniform not only reduces the number of affected students but also gives them a mental support which is essential during this pandemic. Due to the staying home for so many days, their mental health has become deteriorated. And also, that when this pandemic will be over so by using these special uniforms students can attend school and continue their studies further and overcome this pandemic situation. Due to the pandemic COVID-19, people all over the world are suffering from this problem and, in order to lead a new normal life introducing of this special uniform would be a great innovation for students throughout the world during this COVID era. Along with the student-athletes, audiences in the playground and law enforcement team would be the special beneficiary in this regards. The initiative of launching this type of special uniform demands a joint effort from both skilled and talented fashion designer and textile technologists.

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