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Importance of Self-Cleaning Surfaces in COVID-19 Global Pandemic Circumstances



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Muhsin Thottungal

*Msc Pharmaceutical science from Kingston University,
London*

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ABSTRACT

Self-cleaning surfaces can be defined as a class of materials considered for removing the bacteria and virus attached to the surfaces to obtain safety from infectious disease. Self-cleaning is considered to be an interesting topic of bio mimicry due to its diversified uses in various sectors. This report also includes the prospects of the development of self-cleaning surfaces. In addition to this, it underlines the mechanism and methods of self-cleaning surfaces.



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INTRODUCTION

Self-cleaning surfaces can be defined as a method adopted for removing the bacteria from the surfaces to disinfect them. These surfaces are observed from the lotus leaves, water striders, and gecko feet. This report emphasizes the impact of COVID-19 on self-cleaning surfaces. Also, it will discuss the methodologies of self-cleaning surfaces to control the bacteria. Furthermore, it will discuss the global impact of the pandemic on the production and capacity of the company's manufacturing self-cleaning surfaces. The first instance of self-cleaning surfaces was developed in 1995 (Abed, Lalia, and Hilal, 2017). It is important to use them during this virus attack as this will safeguard an individual from the viruses of this disease.

MATERIALS AND METHODS

Self-cleaning surfaces mainly categorized into three categories are Super-hydrophobic, Super hydrophilic, and Photocatalytic. Due to hard stain-resistant fabrics, hydrophobic surfaces are getting help to remove those resistant. They are created with crystal growth on a material surface, plasma or ion etching, and nano-lithography. The main objective of super-hydrophobic is to regenerate the self-cleaning characteristics of the Lotus leaf so that they can repel all water. Super hydrophilic is different from super-hydrophobic because the cleaning process occurs when the water is spread out on surfaces. Last Photocatalytic is the most commonly used self-cleaning products in which both chemicals are used to clean the surface.

It can be used in every sector that can be understood by the study of those sectors. After the pandemic situation, the demand gets very high and it creates problems for both parties organization and customers (Li, Li, and Li, 2020). Due to increase in demand organization face difficulties in production and because of that some of them are not making effective self-cleaning surfaces. Whereas customers need this chemical to clean their surface but they face problems in purchasing because the supply gets very limited and the organization raises the prices that become expensive for customers. It is used in many sectors that are in electronics, clothing, linen for hand hygiene. They are also used in the solar system to remove bacteria from surfaces.

After a pandemic situation, it becomes more difficult in hospitals to use this chemical because some organization reduces their quality of self-cleaning surfaces. They are inspired by natural phenomena that are water strider, lotus leaf, and gecko feet (Xu, Zhang, and Xia,

2016). Due to COVID-19, the problems are increase because the use of self-cleaning surfaces demands get high. Three surface characteristics mentioned below:

- Young's model- It can be described in the below equation:

$$\cos(\theta_0) = \left(\frac{\gamma_{SA} - \gamma_{SL}}{\gamma_{LA}} \right)$$

- Wenzel's model- The equation is given below:

$$\cos(\theta) = R_f \cos(\theta_0)$$

- Cassie-Baxter's model- Equation is mentioned below:

$$\cos(\theta_{CB}) = R_f \cos(\theta_0) - f_{LA}(R_f \cos(\theta_0) + 1)$$

They are an important model that should be cover when an organization makes self-cleaning surfaces.



RESULT

Self-cleaning surfaces are considered to be important to avoid contaminated viruses in an individual's body. Also, due to the rise in COVID-19, there is an increase in the demand for self-cleaning surfaces and disinfectants. Moreover, people try to use these surfaces to safeguard them from the virus attack. Furthermore, there is an increase in the production capacity of these surfaces due to an immediate rise in their demand. Therefore, the scientist has introduced new approaches to in the material of these surfaces to reduce the acquired infection in public spaces especially hospitals. In this relation, many companies have commercialized diversified products based on disinfectant technology. In addition to this, the scientist is devising certain measures to make cost-effective, environment-friendly, durable, and highly sustainable cleaning surfaces. Many companies are being focused on the production of these surfaces as they are used in many sectors like automotive, marine, optical, aerospace, and so on. These surfaces play a major role in minimizing the spread of infectious disease in the health centre (Chen, Hong, and Wu, 2016). Before the coming of

COVID-19, an individual is not concerned about the use of these surfaces but now they are buying it in bulk. This pandemic has increased the demand which has to boost up their prices. Due to which many organizational and small-scale businesses have transformed their business into this sector. But, the workers are not producing effective products due to this virus attack and the imports from China have been restricted. So, there is an increase in the demand for these surfaces but the production and supply are not considered according to the demand figures. Also, the rise in their usage has affected the health of the individual as they are using it multiple times a day.

DISCUSSION

Self-cleaning surfaces are the chemical that helps to clean the surfaces for removing bacteria that can cause any types of diseases. It is found that it can be done in many ways that are the use of self-cleaning with water and without water. After the pandemic situation of COVID-19 in countries, it is found that sudden increment in the number of use of self-cleaning for clean surfaces and removing bacteria from surfaces. They are used in every place whether they are offices, schools, home care, healthcare sector, etc. They applied in every place, their demand gets rise due to corona virus because it is the communicable disease that transmitted from one person to another person very easily. So that's why it is very necessary to use these chemicals for disinfecting the surfaces and any other place (Deng, Long, and Deng, 2017). It is used for not only surfaces but also it can be used for any electronic devices, hand sanitization, etc. There is some material and method require to made self-cleaning surfaces that are mentioned below.

CONCLUSION

From the above report, it can be concluded that self-cleaning surfaces are important to ensure anti-icing, oil-water separation, and anti-fogging. These are also used in solar energy and water purification services. Also, this report covers the two mechanisms of these surfaces and scientists are working hard to fabricate the multi-functionality of the self surfaces. This report has considered the effect of pandemic over the production capacity of the manufacturers of the self surfaces.

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