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Letter to Editors

COVID-19 and picotechnology: Potential opportunities

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ABSTRACT

Humanity's challenges are becoming increasingly difficult, and as these challenges become more advanced, the need for effective and intelligent action becomes more apparent. Meanwhile, the novel coronavirus disease (COVID-19) pandemic, which has plagued the world, could be considered as an opportunity to take a step toward the need for atomic engineering, compared to molecular engineering, as well as to accelerate this type of research. This approach, which can be expressed in terms of picotechnology, makes it possible to identify living cell types or in general, chemical and biological surfaces using their atomic arrays, and applied for early diagnosis even treatment of the disease.

Every great event that has taken place in human science originates from a convergence point. A point that highlights the boundary between current technology and science with problems and challenges, and shows the need to use more advanced science. From December 1959 to December 2019, an interesting time event, there is plenty of room at the bottom [1] that have mentioned by Richard Feynman led to the emergence of nanoscience, and this science in itself led to significant advances in chemistry, physics, astronomy, medicine, and even philosophy. However, one step back, Feynman was a physicist who, with the view of physical parameters, was able to shift the boundary of knowledge to such an extent, but in today's age, other relative physical parameters cannot solve problems that require great precision. More precisely, if we want to discuss, from the middle of the twentieth century to the end of the twentieth century, with the unknown and non-engineering features that nanotechnology could give to human beings, significant progress has been made. In the first and second decades of the 21st century, the need to engineer and predict properties at the nanoscale was felt, and the attention of many scientists was drawn to this direction, which led to the emergence of more advanced technologies including solar cells, quantum computers, nanocatalysts, early diagnosis and detection of diseases and nanomedicine. However, in the third decade of the 21st, nanotechnology does not seem to be able to solve the challenges posed by nature or man with more precision. At this time, as the challenges are more delicately engineered, the solution structure engineering must be done more carefully [2,3].

Three orders of magnitude smaller than nanotechnology, which is called picotechnology, can be able to give us the atomic architecture instead of molecular structure, which enable scientists to change the structural features of atomic arrays with alteration of electrons and their energy states [4,5]. Most of the biological mechanisms are based on the interactions at the atomic or even subatomic levels including intracellular functions, and/or by altering the surface energy, bond angle or bond length in the atomic architecture, a specific interaction can be created or controlled [6]. In this regard, dealing with the virus-based challenges, in which most of their difference are belongs to their genetic material, are based on their genetic materials, which leads to multiple experiments as well as long periods of time. But if we look at it from the atomic point of view, there are no two biological structures that are one hundred percent compatible with surface morphology.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) consists of four proteins and has over 30,000 nucleotides in its RNA genome [7], but identifying this genetic sequence as well as comparing it to other viruses, and using the experiences of those viruses, cannot lead to a short-term and reliable solution. However, study on the surface morphology of those proteins, showed three structural proteins on the surface including small envelope protein (E), spike surface glycoprotein (S) and matrix protein (M), which is the S protein is responsible for more than 80% of the interactions with the cellular membrane. Along with the biochemical structure of the surface proteins, the exact chemical atomic architecture of that is of great importance, in this manner, S proteins have NH_2^-,…,-S-Cys-G-S-Cys-Cys-K-,…,–COOH sequence [8], and based on the crystallography studies around spike proteins, these proteins usually have T = 4 surface lattice that have been associated with a trimer of heterodimers that attached to the targeted receptor with the radius of 345 Ã… [9], however, these data are not for SARS-CoV-2, but can be generalized and used based on past studies. Also, different biological microenvironments, and also different viruses, have different surface morphology in terms of their bond length between the amino acids, bond angle and also sequence, and this is an opportunity, an opportunity that can be exploited using picoscience architecture to specialize an agent to influence a particular targeted site. In other words, in micro and nano sciences, target sites were a collection of molecules or living cells, but in picoscience, target sites are a limited number of atoms that are arranged in a regular and definite structure.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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