Detection of COVID-19 Virus on Surfaces Using Photonics: Challenges and Perspectives

Bakr Ahmed Taha, Yousif Al Mashhadany, Nur Nadia Bachok, Ahmad Ashrif A Bakar, Mohd Hadri Hafiz Mokhtar, Mohd Saiful Dzulkefly Bin Zan and Norhana Arsad

Abstract:

The propagation of viruses has become a global threat as proven through the coronavirus disease (COVID-19) pandemic. Therefore, the quick detection of viral diseases and infections could be necessary. This study aims to develop a framework for virus diagnoses based on integrating photonics technology with artificial intelligence to enhance healthcare in public areas, marketplaces, hospitals, and airfields due to the distinct spectral signatures from lasers' effectiveness in the classification and monitoring of viruses. However, providing insights into the technical aspect also helps researchers identify the possibilities and difficulties in this field. The contents of this study were collected from six authoritative databases: Web of Science, IEEE Xplore, Science Direct, Scopus, PubMed Central, and Google Scholar. This review includes an analysis and summary of laser techniques to diagnose COVID-19 such as fluorescence methods, surface-enhanced Raman scattering, surface plasmon resonance, and integration of Raman scattering with SPR techniques. Finally, we select the best strategies that could potentially be the most effective methods of reducing epidemic spreading and improving healthcare in the environment.