Features and in vitro assessment of anti-coronavirus activity of organic paints on human lung fibroblasts

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In recent decades, respiratory tract infection viruses, particularly SARS-CoV-2, have become a major global concern due to their rapid transmission and high mortality rates. Innovative antiviral coatings and textiles incorporating nanoparticles and other compounds have been explored in response. This study examined features, cytotoxicity, and the antiviral properties of three bioactive nano-silver-based compounds functionalised with organic paints, specifically for use in personal protective equipment like masks. We assessed onsite synthesised nanosilver alongside commercially available antibacterial additives, including nanosilver dispersed in colloidal silica and silver sodium hydrogen zirconium phosphate, as potential antiviral agents in organic paints against Human coronaviruses, which represent respiratory tract infection viruses. Developed organic paints have been assessed using STEM transmission electron microscopy and energy-dispersive X-ray spectroscopy. To evaluate the cytotoxicity and antiviral efficacy of these paints, we employed a neutral-red-uptake cytopathic assay, with data analysis conducted using smartphone technology. The results showed that nanosilver on colloidal silica functionalized on organic paint exhibited the most significant antiviral activity and non-cytotoxicity in comparison to other evaluated materials.

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Biography

Maja A. Zaczek-Moczydłowska graduated from the Silesian University of Science and Technology, Faculty of Chemistry, Gliwice, Poland in 2006 with a Master of Science Engineering degree. She completed a PhD project in the years 2015-2018 and received her doctoral degree in Microbiology from Queen's University Belfast, School of Biological Sciences, Northern Ireland, UK in 2019. From 2006-2015 she worked in the biomedical, pharmaceutical and food industries. After completing her PhD, from March 2019-December 2021, she worked as a Postdoctoral Researcher at Queen's University Belfast in Northern Ireland, UK, focusing on the development of point-of-care detection systems such as molecular methods and biosensors. From 2022-2023 she was a lecturer in epidemiology and microbiology. From 2023, Dr. Eng. Zaczek-Moczydłowska has worked as a Postdoctoral Researcher at the Biotechnology Centre, Silesian University of Technology in Gliwice, focusing on the assessment of antiviral activity of biomaterials. Her research interests include medical biotechnology, virology, biomaterials and biosensor development.

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