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# Investigating Anti-bacterial and Anti-Covid-19 Virus Properties and Mode of Action of $Mg(Oh)_2$ and Copper-Infused $Mg(Oh)_2$ Nanoparticles on Coated Polypropylene Surfaces

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**Abstract :** Reported herein is an investigation of anti-bacterial and anti-virus properties, mode of action of $Mg(OH)_2$ and copper-infused $Mg(OH)_2$ nanoplatelets (NPs) on melt-compounded and thermally embossed polypropylene (PP) surfaces. The anti-viral activity for the NPs was studied in aqueous liquid suspensions against SARS-CoV-2, and the mode of action was investigated on neat NPs and PP samples that were thermally embossed with NPs. Anti-bacterial studies for melt-compounded NPs in PP confirmed approximately 1 log reduction of E. coli populations in 24 h, while for thermally embossed NPs, an 8 log reduction of E. coli populations was observed. In addition, the NPs exhibit anti-viral activity against SARS-CoV-2. Fluorescence microscopy revealed that reactive oxygen species (ROS) is the main mode of action through which $Mg(OH)_2$ and Cu-Infused $Mg(OH)_2$act against microbes. Plastics with anti-microbial surfaces from where biocides are non-leachable are highly desirable. This work provides a general fabrication strategy for developing anti-microbial plastic surfaces.

**Keywords :** anti-microbial activity, E. coli K-12 MG1655, anti-viral activity, SARS-CoV-2, copper-infused magnesium hydroxide, non-leachable, ROS, compounding, surface embossing, dyes
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