MSE Guest Seminar

Thursday July 14th | 2:00 PM | ARMS 1103

Sustainable and effective antimicrobial surface coating based on natural cellulose

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Abstract: We developed a sustainable and effective antimicrobial surface coating based on micro-fibrillated cellulose (MFC). The porous coating is hardly noticeable to human eyes due to its sub-micron thickness, of which the coverage, porosity and microstructure can be modulated by the formulations developed. Using goniometers and a quartz crystal microbalance (QCM), we observed a threefold reduction in water contact angles and accelerated (more than 200%) water evaporation kinetics on the cellulose coating. The coating exhibits not only a rapid inactivation effect against SARS-CoV-2 in 5 minutes, following deposition of the virus loaded droplets, but also an exceptional ability to reduce contact transfer of liquid, e.g. respiratory droplets, onto surfaces such as artificial skin by more than 90%. Additionally, the cellulose coating shows nearly 100% resistance to scraping in dry condition thanks to its strong attachment to the substrate, whilst good removability once wetted, suggesting its practical suitability for daily use. Importantly, the coating can be formed on solid substrates readily by spraying and requires solely a simple formulation of a plant-based cellulose material with no additives, rendering it a scalable, affordable and green solution for antimicrobial surfaces.