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Self-sterilizing surfaces using doped clay/Polymer nanocomposites

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Biofilms aggressively colonize and spread among many surfaces, including toilets, furniture, medical beds, countertops, keyboards, touchpads, equipment and storage bays, computers, cabinets and lockers. There exists a critical need for surface modification of these types of surfaces that imparts an antimicrobial capability. Most hospitals and medical facilities rely on antimicrobial washes to achieve coated surfaces that are resistant to bacterial growth and biofilms. Unfortunately, the uses of antimicrobial washing agents have resulted in increased bacterial resistance and the rise of institutional-bred infections.5,6 Thisis a significant health issue for those being treated in health care facilities, and especially a problem for immune-compromised patients. This research encompasses the formulation of a new hybrid rubber polymer nanocomposites. Polymers were infused with halloysite nanotubes (HNTs), gold nanoparticles, and photosensitive agents, such as methylene blue and crystal violet. Tensile strengths and thermal gravimetric analysis showed that material properties are maintained with the addition of HNTs. UV-Visible spectroscopy showed that HNTs increase the loading percentages of photosensitive agents during solvent swelling processes. Scanning electron microscopy was used to study the nanotopographies and transmission electron microscopy showed interactions of HNTs and gold nanoparticles. ATP fluorescence detection results demonstrated the antimicrobial properties of the hybrid rubber/HNT nanocomposites. It is suggested that these types of rubber nanocomposites are ideal candidates for use as a novel antimicrobial surface and surface coating systems.

Biography

Chris Boyer is currently a PhD candidate in Molecular Science and Nanotechnology at Louisiana Tech University. Jeffery Ambrose is a PhD candidate in Biomedical Engineering at Louisiana Tech University.

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