Anti-VOCs and Antimicrobial Activity of Natural Palm Waste Cellulose Fibers/ZnO Nanoparticles Biocomposite for Use in Face Masks: The GBV99

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As industrial cities all around the globe are expanding, air quality has been deteriorating. Volatile Organic Compounds (VOCs), which are carbon-based molecules, are anthropogenically released into the environment, posing a serious threat to millions worldwide. Moreover, commonly used surgical masks are not antimicrobial, as studies have shown that about 90% of microorganisms such as bacteria and viruses are stable on mask surfaces for up to 8 hours. In addition, the melt-blown fabrics used in current bacterial masks have environmental consequences as they are difficult to decompose. The purpose of my project is to synthesize the palm cellulose biocomposite by in situ interfacial polymerization and support it with a novel antimicrobial agent possessing no side effects using ZnO nanoparticles. After 24 hours of continuous stirring, the obtained material was purified to remove any unreacted components. The polyamide, cellulose, and ZnO nanoparticles solution was spread out on thin nanosheets using a glass rod, then left to dry for 24 hours, which would form a layer of the novel GBV99 face mask. The fundamental composition of the GBV99 was then characterized by SEM and EDX analysis. GBV99 was tested against airborne VOCs using gas chromatography-mass spectroscopy, which proved to have over a 99.9% efficacy. The GBV99 also demonstrated remarkable antibacterial and antifungal properties when subjected to strains such as Staphylococcus aureus and Candida albicans, respectively. The GBV99 is highly efficient, sustainable, and could potentially contribute to resolving nosocomial cross-contamination and disposing of non-biodegradable masks.

Awards Won:
King Abdulaziz &amp
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