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Application of nanotechnology for self-sanitizing keyboards in an academic institution

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Keyboard is the major input device which is constantly in contact with humans and acts asa potential reservoir of infectious microorganisms. Multiple user computer keyboards are likely to have a larger number of microorganisms as compared to single user computer keyboards. Present study was designed with a specific objective to develop self-sensitizingcomputer keyboards to reduce nosocomial infections. Titania nanotubes (TNTs) were prepared from already prepared titania nanoparticles (TNPs) using hydrothermal treatment method. Silver (Ag) doped TNTs were prepared using sol-gel method. TNTs and TNPs were characterized using SEM, EDX, XRD and FTIR. Resulting titania nanostructures were in range of 24 to 35 nm. Selected keys of a standard keyboard were coated with a commercial adhesive containing 1% TNTs to create a disinfecting surface. Microbial samples were taken at specific time intervals using sterilized cotton swab and cultured on freshly prepared nutrient agar plates. Disinfection capabilities were compared with control. Silver doped TNTs showed better disinfection capability as compared to undoped and control.

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Synthesis and characterization of carbon nanotubes quicklime nanocomposites using Co catalysts supported on CaO derived from carbonate stones

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This work involves the synthesis of carbon nanotubes quicklime nanocomposites (CQNs) via the CVD technique of n-hexane using Co metal catalysts supported on CaO obtained from local carbonate stones. The CVD process was conducted at temperatures between 600°C and 900°C. XRD results show that at temperatures higher than 700°C, peaks attributable to CNTs are present. As the composition of the catalysts is changed, it can be seen that samples synthesized using catalyst composition of 10, 15 and 20 wt% Co exhibit peaks that are attributable to CNTs with the sample obtained using Co/CaO (20 wt%) catalyst giving the highest XRD peak intensity. The morphology determination of the CQNs produced using Co catalysts show that the products have varying diameters and the catalysts metal particles can also be observed. Transmission electron microscopy of the CQNs confirmed the existence of nanotube morphology in the samples. Thermogravimetric analyses of the CQNs show that there are two major weight losses which are due to amorphous carbon decomposition (300-400°C) and oxidation of CNTs (400-600°C). Raman spectroscopy of the samples show that CQNs synthesized at 800°C using 20 wt% Co gave the highest I_G/I_D ratio (2.169) indicating a high degree of graphitization. Incorporation of the CaO from carbonate stones in this type of CNT nanocomposites may make this material useful in applications such as advanced building materials.

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