CuO Nanostructure Incorporated Epoxy for Building Blocks of Antimicrobial Efficient Water Pipes and Kitchen Countertops

Baamer, Rowaid (School: Al-Aqsa Private Schools)

Biofouling is the accumulation of microorganisms or plants on wet surfaces. It poses risks for humans and on a wide variety of surfaces. Biofouling also can af-fect industries like paper manufacturing, food processing, underwater construc-tion, and desalination plants. This study aims to fabricate CuO nanostructure in-corporated epoxy to be used as an antimicrobial on wet surfaces. CuO, which has a strong antimicrobial activity, was prepared in nanosheet forms through the microwave technique. The nanosheets were then incorporated in epoxy resin to strengthen its mechanical properties. The fabricated nanocomposite was used to design antimicrobial water pipes and kitchen countertops. Five specimens were produced and their mechanical properties tested through a tensile testing system. Their tensile strength increased from 33.488 MPa to 38.128 MPa, while the stiff-ness was increased from 52810 N/m to 578910 N/m. The breaking load of CuO incorporated samples was also increased which affected Young's modulus. Next, the samples were exposed to different microbial materials, such as Gram-negative (E.coli), Gram-positive (B.subtilis) bacteria, and yeast (S.cerevisiae). This was to done to evaluate the solution as an antimicrobial plastic. The inhibition zone showed that the microbes did not grow on the surface of the samples. To con-clude, the CuO nanosheets showed an enhancement in the morphological, me-chanical and antimicrobial properties on wet surfaces. This has the potential to be useful in building a barrier to prevent biofouling on wet surfaces and to insure a future clean water solution for the human use and other everyday applications.

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