Montmorillonite/Copper Oxide Nanocomposites, Synthesis and Evaluations

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The Copper Oxide nanoparticles (CuO NPs) are important materials for fundamental studies due to their size and large surface areas and antibacterial properties. Montmorillonite (MMT) is a kind of clay which exists in nanometer size. The external and interlamellar spaces of MMT were used as solid support for synthesis of CuO NPs at room temperature by the chemical reduction method. In this project, Copper Nitrate plus water (Cu(NO$_3$)$_2$. $x$H$_2$O) and Sodium Hydroxide (NaOH) were used as Copper precursor and reducing agent respectively. Then, MMT/Cu$^+$ nanocomposites were stabilized with different range of the weight percent of Polyethylene glycol (PEG). The solids were characterized by X-Ray diffractometry (XRD), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Fourier transform infrared (FT-IR) and UV-Visible spectroscopy. The antibacterial activities of different sized of CuO NPs in MMT were investigated against Gram-positive, *Staphylococcus aureus* and Gram-negative bacteria, *Escherichia coli*, by the disk diffusion method using Muller-Hinton agar (MHA). These results were showed that smaller CuO NPs were found to have higher antibacterial activities. By this method we were able to obtain CuO NPs with different sizes and making them applicable to medical applications and can be used as effective growth inhibitors in different biological system.

REFERENCES