TITLE: SYNTHESIS AND CHARACTERIZATION GRAPHENE OSIDE SUPPORTED WITH COPPER AND SILVER NANOPARTICLE AND APPLICATION IN REMOVAL OF *Escherichia Coli*

AUTHORS: BAZANA, S.L.; SHIMABUKU, Q.L.; BERGAMASCO, R.; GOMES, R.G.;

INSTITUTION: UNIVERSIDADE ESTADUAL DE MARINGÁ, UEM, (AVENIDA COLOMBO, 5790 CEP 87020-900, BLOCO D 90 – DEPARTAMENTO DE ENGENHARIA QUIMICA- PR, MARINGÁ)

Antibacterial material for application in drinking water purification were produced from oxide graphene (GO). GO was prepared from purified graphite flakes using a modified Hummer's method. The reduced graphene oxide (RGO) was supported with silver (Ag) and copper (Cu) nanoparticles (NPs). The materials were produced using solution of silver and copper ions was added to the GO suspension under constant stirring followed. Were prepared using a solution containing 0,029 M for each metal ion . The structural characterization was performed by Diffraction X-Ray analysis (XRD) and morphological characterization by Transmission Electron Microscopy (TEM) and Transmission Electron Microspore (MET). The physical characterization used a micro-Raman sytem using a 532 nm helium Neon laser source was used to collect the Raman scaterring pattern. Significant physico – chemical changes took place during the chemical conversion from GO to RGO, and the RGO composites were evaluated using various techniques. The presence of silver and copper nanoparticles on the surface of RGO can be confirmed from the XRD. To investigate the morphology and structure of the products, SEM and TEM images of GO, RGO and the RGO supported with nanoparticles show representative imagen of the GO end RGO sheets and the presence the silver and copper nanoparticle. The Raman spectroscopy shows the existence of two well-defined and distinct bands for RGO. The appearance of these two bands is the main characteristic. The first band (D-band) occurs around 1331 cm^{-1} and is related to defects in the sample. The second and more characteristic band of graphene occurs at 1588 cm^{-1} (G-band). This band is associated with optical phonons between two different atoms of a unit cell and corresponds to the vibration on the sp2 plan of the carbon atoms. The produced materials were evaluated for antibacterial activity against *Escherichia coli* in water purification showed an antibacterial activity less than 2 log reduction. However, the produced material with combination of NPs of Ag and Cu showed a high antibacteril activity (6 log) completely inhibiting the bacterial growth, and therefore, this can be considered as potential antibacterial material for water purification.

Keywords: Graphene oxide. Nanoparticles. Silver. Copper. Antibacterial activity.