

# SAFETY ASSESSMENT OF SILVER DECORATED GRAPHENE NANOSPONGES

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**INTRODUCTION:** Graphene-derived nanomaterials have gained attention across various fields such as electronics, medicine, and construction. Among them, these 3D graphene nanosponges decorated with silver (GAg), a new unreleased material, are being studied as potentially less toxic materials. **OBJECTIVE:** To assess the safety of GAg *in vivo* model. **MATERIALS AND METHODS:** We used the free-living nematode *Caenorhabditis elegans*, which has a short life cycle, easy manipulation, well-defined life and reproductive stages, and transgenic strains with green fluorescent protein (GFP) for the analysis of protein expression. For the experiments, we synchronized the nematodes using a bleaching solution (5:4:1 H<sub>2</sub>O; NaClO; NaOH) to break the worm cuticle and release the eggs; After 12-14 hours, at the first larval stage, we exposed the L1 larvae to GAg solutions at concentrations of 1, 2.5, and 5 mg/L for 30 minutes and transferred them to plates containing nematode growth medium and *Escherichia coli* OP50 as a food source. Forty-eight hours later, we conducted survival, swimming movement, length, number of brood, and reactive oxygen species (ROS) presence analyses using the 5(6)-Carboxy-2',7'-dichlorofluorescein reagent. We also analyzed the expression of the antioxidant enzyme superoxide dismutase 3 (SOD-3) using the CF1553 strain (muls84 [(pAD76) *sod-3p::GFP* + rol-6(su1006)]) and the detoxifying enzyme glutathione-S-transferase 4 with the CL2166 strain (dvIs19 [(pAF15) *gst-4p::GFP::NLS*] III). **RESULTS:** After conducting the experiments, survival was significantly reduced at the highest concentration (5 mg/L), with nearly all nematodes exposed to this concentration being dead. Thus, subsequent experiments were conducted without this concentration. The length of the nematodes was negatively affected at the 2.5 mg/L concentration, while swimming and progeny size did not show differences compared to the control group. Analyses related to ROS, SOD-3, and GST-4 also did not show significant differences. **CONCLUSION:** GAg nanosponges exhibited toxic effects, especially at higher concentrations. The marked mortality at 5 mg/L and reduced body length at 2.5 mg/L suggest toxicity, possibly due to the silver component, which is known for its harmful effects on living organisms.

**Keywords:** nanosecurity; oxidative stress; carbon derived materials.