

## Analysis of Toxic Effects of Silver Nanoparticles on *Escherichia coli* Using Bioluminescence Bacteria

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This study shows that the toxic effects of actions by AgNPs were compared with the results obtained from AuNPs and silver nitrate, using the stress promoter responses from eight bioluminescent bacteria. Based on the changes in the bioluminescence, the AgNPs resulted in a higher cellular toxicity than the same amount of AuNPs. In addition, the AgNPs cause heat shock and oxidative damage to the bacterial cells, but not DNA damage, while AuNPs had no response at the same test concentrations. Using two enzymes, superoxide dismutase and catalase, which relieved oxidative stress, added to them with the AgNPs showed a reduced induction of the *sodA* promoter when compared to cultures exposed to AgNPs alone, indicating that oxidative radicals are being generated due to the nanoparticles. Silver nitrate, used to evaluate differences between the silver ion and the nano-sized silver particles, was also found to causes heat shock damage and oxidative stress within the bacterial cells. However, induction of silver nitrate was not relieved by the addition of enzymes, indicating that there is difference in toxic effects of action between the silver nanoparticles and the silver ion.