

P042 Phyto-formation of silver and gold nanoparticles
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Suspension culture of stevia was examined for uptake of silver from AgNO_3 solution. Alfalfa and mung bean sprouts were also studied for accumulation of silver when grown in AgNO_3 solution. Atomic absorption analysis confirmed the presence of silver in both sprouts and suspension cultures after a period of exposure to AgNO_3 solution, despite well known toxic effects of silver on living matter. Similar studies were also conducted to examine the intra-cellular contents of gold in the suspended cells of carrot, periwinkle, and stevia, and in the sprouts of mung bean and alfalfa, all in contact with KAuCl_4 solution. It was observed that gold contents are noticeably enhanced, overall, as the gold concentrations in contact with the plant cells or the sprouts increase, confirming the extraction and transportation of gold ions into the cells of the plants tested. In addition, the contents of gold in cells cultivated in suspension cultures are, in general, much more than several-fold higher compared to that in sprouts.

Extract from *Pelargonium graveolens* underwent reaction with both AgNO_3 and KAuCl_4 to form either silver or gold nanoparticles, which exhibit distinct colors in aqueous solution due to surface plasmon resonance. For the reaction with AgNO_3 , it was observed that, for the three cultivars studied in this project, light was required for initiation of the reaction. In contrast, reactions producing gold nanoparticles were unaffected by light. Effect of oxygen was also examined for reactions involving gold and silver, and was observed to have little, if any, effect on the progression of reaction.