



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

<b>Name(s)</b> <b>Konish Bhattacharya</b>	<b>Project Number</b> <b>J0502</b>
<b>Project Title</b> <b>Green Synthesis of Silver Nanoparticles Using Asparagus Extract and Their Use as Antibacterial Agent</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> In this project silver nanoparticles have been synthesized from silver nitrate using Asparagus extract containing the flavonoid, quercetin (a green synthesis). The objective was to test whether a plant derived flavonoid can be used to synthesize silver nanoparticle from silver nitrate solution and could be employed to kill harmful bacteria.</p> <p><b>Methods</b> Asparagus stems, silver nitrate 0.01 M aqueous solution, distilled water, quercetin, petri dish for bacteria colony. In direct sunlight four different concentration of asparagus extract (2 mL, 4mL, 6mL, 8mL) was added in separate cups each containing 20mL of 0.01 M silver nitrate aqueous solution and noted the change of color of solution over time. Same experiment was repeated in ambient light. In the laboratory, a drop of silver Nanoparticles made with 4mL asparagus extract and 20mL of 0.01 silver nitrate aqueous solution was placed on two petri dishes containing E.Coli and S. Epidermidis bacteria.</p> <p><b>Results</b> In this experiment the color of silver nitrate solution changed once asparagus extract was added, which means silver nanoparticles were being produced. The bacteria test result showed these nanoparticles cleared both the E.coli and S. Epidermidis colonies which means the silver nanoparticles were effective as an antibacterial agent.</p> <p><b>Conclusions</b> In my experiment use of asparagus as a source of quercetin which acts as a reducing agent to produce silver nanoparticles, is a novel approach. This is an environmentally friendly process. These silver nanoparticles exhibited strong anti-bacterial properties against both Gram-negative and Gram-Positive bacteria. Bacteria are unable to develop immunity to silver. Thus, silver nanoparticles can be more effective than conventional antibiotics. The nanoparticles could be used in making antibiotic bandages for wounds.</p>	
<b>Summary Statement</b> Synthesis and examination of antibacterial effect of silver nanoparticles.	
<b>Help Received</b> Jenny Stenger-Smith in the laboratory of Prof. Mascharak at UCSC provided the chemicals and help in the bacterial studies.	