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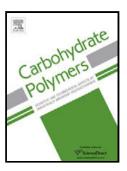
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## ACCEPTED MANUSCRIPT

- 1 Green Synthesis of Silver and Copper Nanoparticles using Ascorbic acid and
- **2 Chitosan for Antimicrobial Applications**
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#### Abstract

Silver and copper nanoparticles were produced by chemical reduction of their 13 14 respective nitrates by ascorbic acid in the presence of chitosan using microwave heating. Particle size was shown to increase by increasing the concentration of nitrate 15 16 and reducing the chitosan concentration. Surface zeta potentials were positive for all nanoparticles produced and these varied from 27.8 to 33.8 mV. Antibacterial activities of 17 Ag, Cu, mixtures of Ag and Cu, and Ag/Cu bimetallic nanoparticles were tested using 18 19 Bacillus subtilis and E. coli. Of the two, B. subtilis proved more susceptible under all 20 conditions investigated. Silver nanoparticles displayed higher activity than copper and 21 mixtures nanoparticles of the same mean particle size. However when compared on an 22 equal concentration basis Cu nanoparticles proved more lethal to the bacteria due to a higher surface area. The highest antibacterial activity was obtained with bimetallic 23 24 Ag/Cu nanoparticles with minimum inhibitory concentrations (MIC) of 0.054 and 0.076 mg/L against *B. subtilis* and *E. coli* respectively. 25

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