Supporting Information:

Growth of Branched Ag Nanoflowers Based on Bioinspired Technique: Their SERS and Antibacterial Activity

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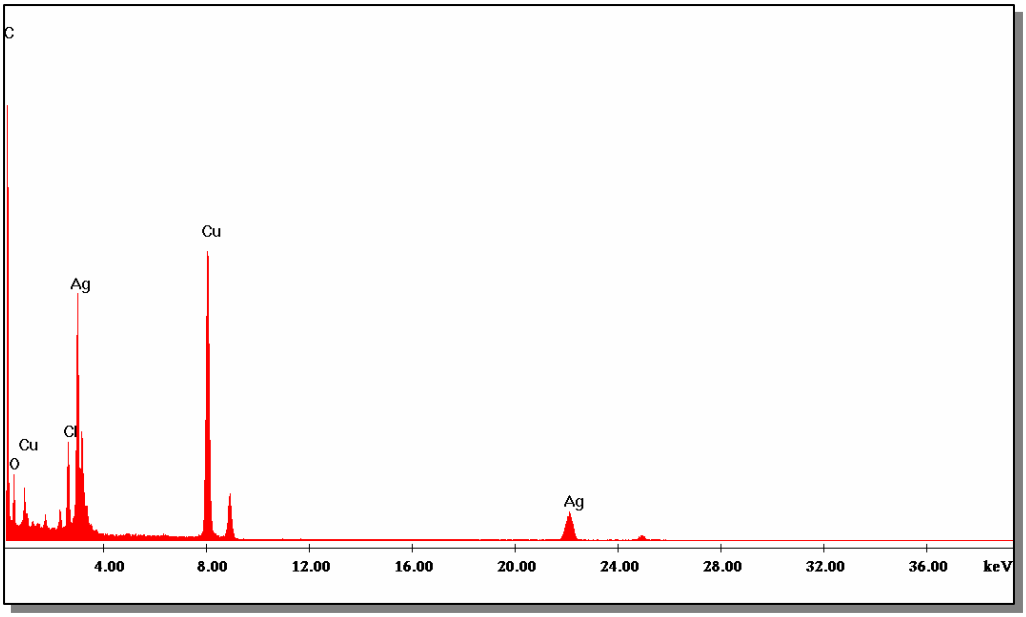

Figure S1. EDAX spectra of SNFs induced by rutin

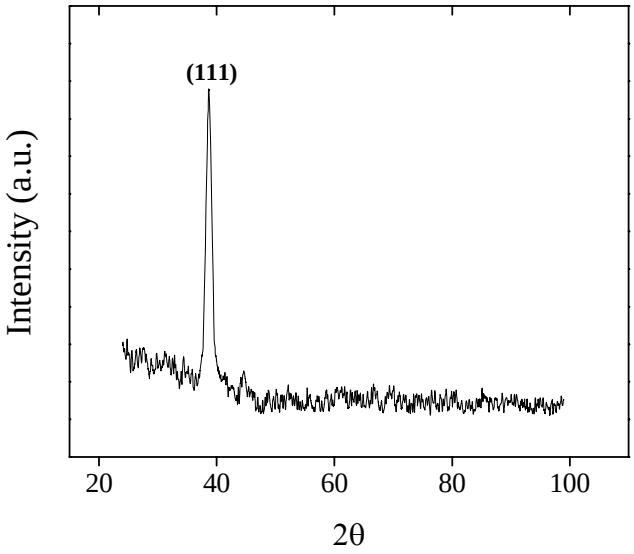

Figure S2. XRD spectrum of SNFs induced by rutin

For a complete understanding of formation process and mechanism in the growth of such flower shaped branched Ag nanoparticles, a morphology evolution study was carried out over total reaction time. Products were collected from the reaction solution at different time and cast over the carbon coated copper grid for TEM measurement.

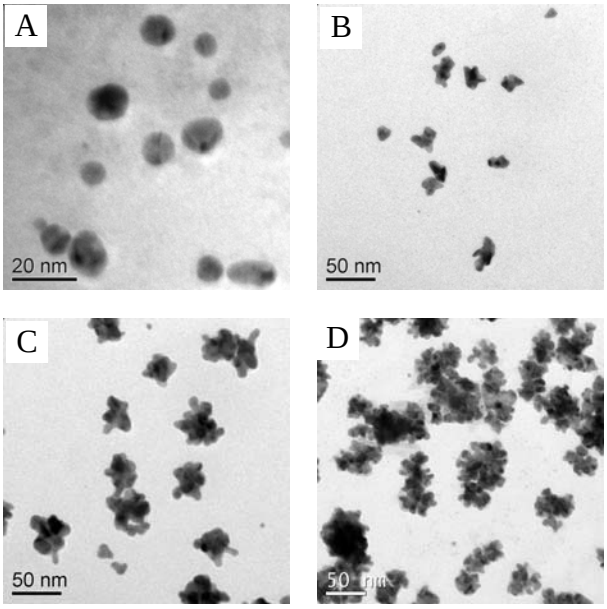

Figure S3. TEM measurements showing the growth stages of silver nanoflowers at different time intervals of the reaction. (A) 5 min (B) 10 min and (C) 20 min and (D) 30 min.

In order to check the role of the concentration of precursor on the shape and size evolution of nanoparticles, the Ag nanoparticles were synthesized with different concentration of Ag^+ at a fixed concentration of rutin.

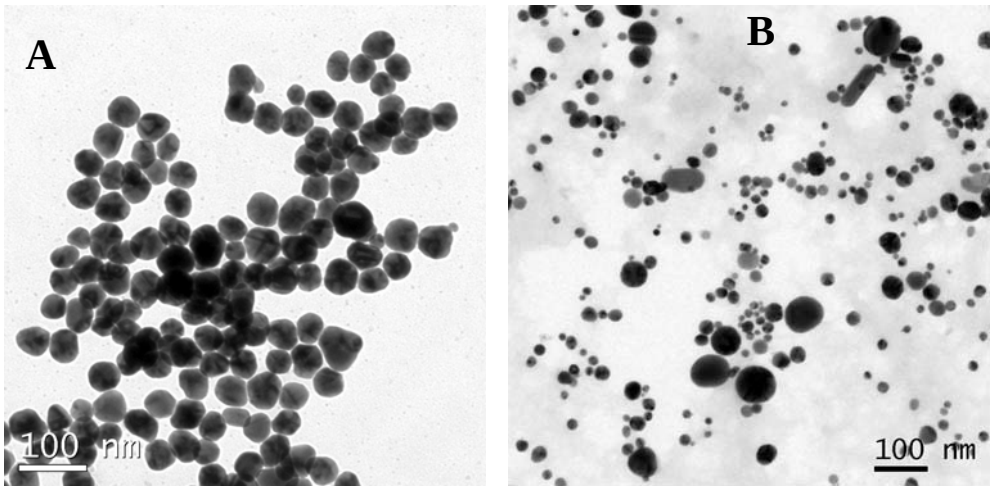

Figure S4. TEM images showing the formation of Ag nanoparticles at different concentration of Ag^+ at a fixed concentration of rutin. [Rutin]: 0.3 mM; [Ag+]: (A) 0.5 mM and (B) 2mM.

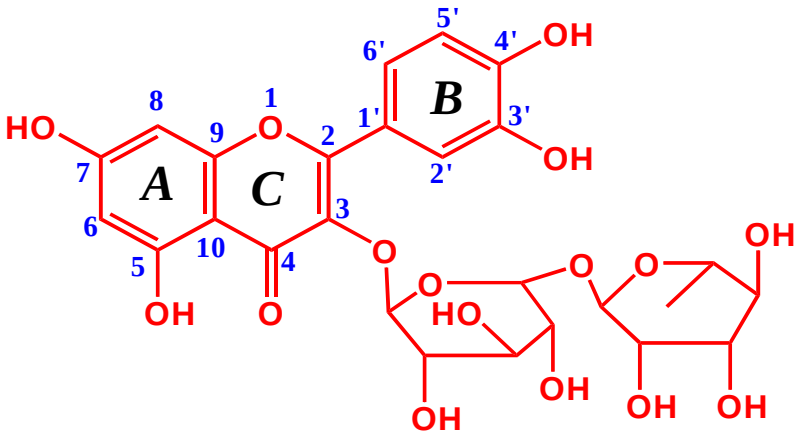

Figure S5. Structure of rutin

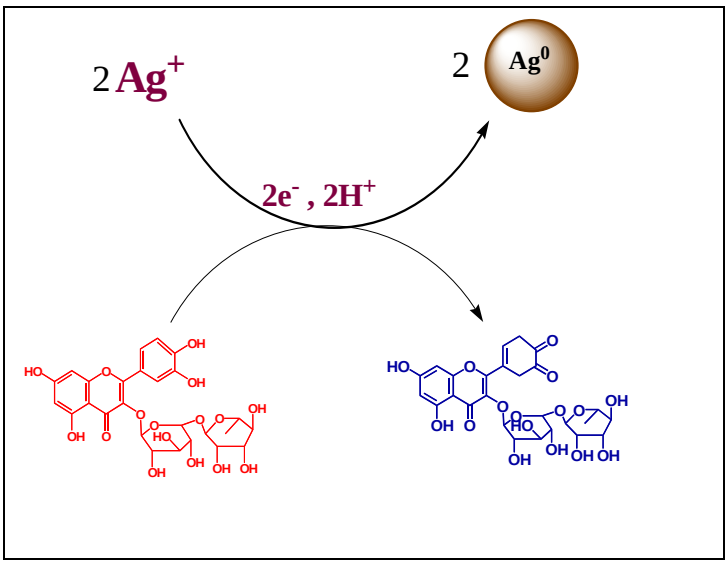

Figure S6. Schematic presentation showing the possible mechanism towards reduction of Ag^{+} by rutin.

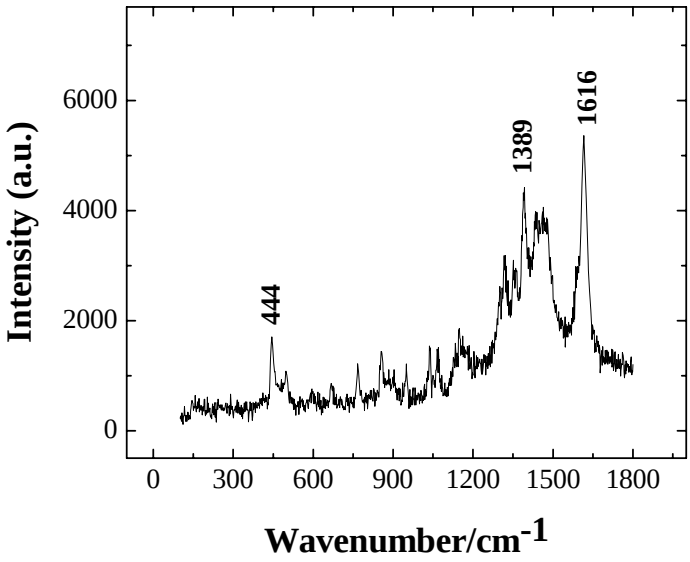

Figure S7. Raman spectra recorded for solid MB

In order to check whether the morphology of the nanoparticles plays a significant role in the SERS activity, the Raman spectra were recorder at the three different nanoparticle modified substrate synthesized by rutin.

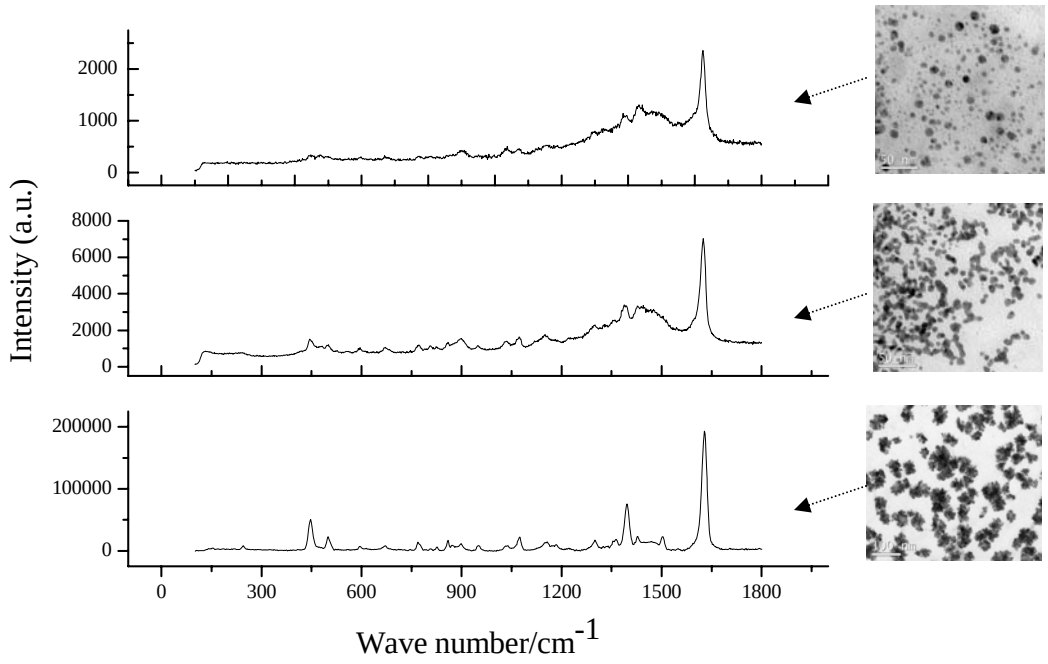

Figure S8. Raman spectra of MB (1μM) recorded on substrates modified with different shapes of nanoparticles. Right hand side shows the corresponding TEM photographs with arrow marks.

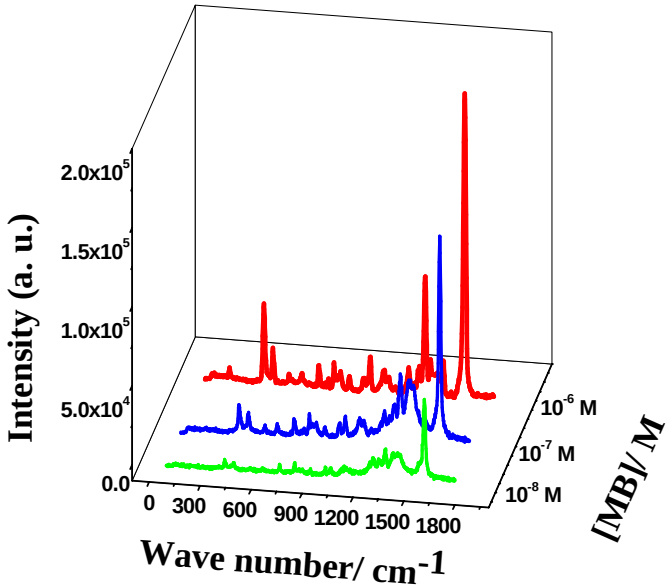

Figure S9. SERS spectra of MB at different concentrations adsorbed on the SNFs modified substrate.

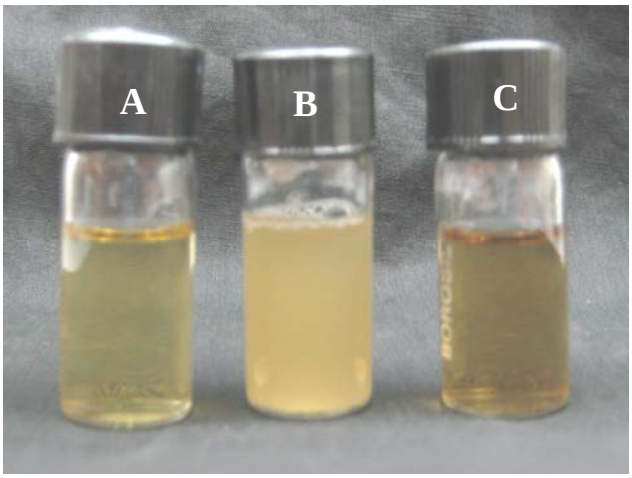

Figure S10. Photographic image showing the antibacterial activity of SNFs. (A) growth medium, (B) after growth of bacteria (E. Coli) and (c) bacteria solution in presence of SNFs after 24 hr.

Citrate stabilized nanoparticles were synthesized according to the previous report (Turkevich et al. *J. Discuss. Faraday Soc.* **1951,** *11*, 55) by slight modification. In brief, Ag nanocolloids are prepared by reducing $AgNO_3$ (1 mM) with sodium citrate (0.3 mM) in aqueous medium at boiling temperature. The concentration of reagents used for synthesis of citrate stabilised nanoparticles are equal to the concentration used for rutin.

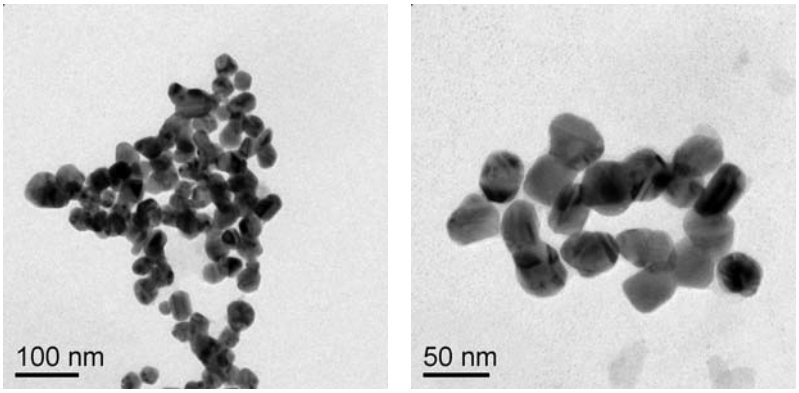

Figure S11. TEM images for citrate stabilised Ag nanoparticles.

A comparative bacterial inhibition studies are made with different nanoparticles. Four different types of nanoparticles stabilised by rutin and citrate were used to explore their efficacies against *S. Faecalis*. Below shows the TEM images of different shapes of nanoparticles with the bacterial inhibition disc.

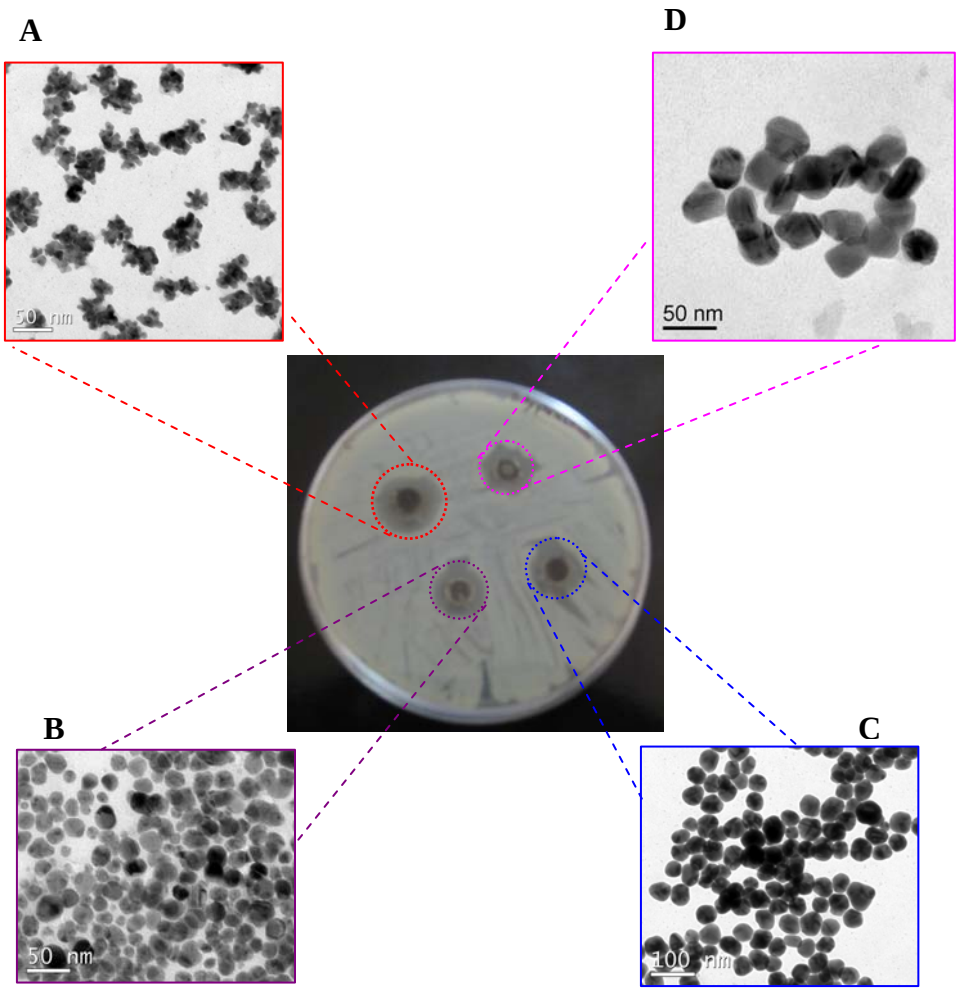

Figure S12. Diffusion disc showing the antibacterial efficacies of four different shapes of nanoparticles induced by rutin (A, B, C) and citrate (D) against *S. Faecalis* bacterium.