SERS detection of Methylene Blue and Crystal Violet using silver nanostars.

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ABSTRACT

In this work, silver nanostars were synthesized using silver nitrate, ascorbic acid and PVP, in a molar ratio of 3.6:71.5:X, respectively. Where x is the concentration of PVP which varied from 0.1 to 10 mM. The behavior of morphology and size of the nanostars was studied by scanning electron microscopy and UV-Vis absorption. In addition, SERS substrates were fabricated depositing silver nanostars over copper film in order to determine which morphology and size offer the lowest detection limit of methylene blue and crystal violet. These studies allow us to identify nanostars as an excellent nanostructure for the fabrication of ultrasensitive SERS substrates for the detection of persistent organic pollutants.

RESULTS

AgNO3 [mM]	L:AA [mM]	PVP [mM]	R1=[AgNO3]/[L:AA]	R2=[AgNO3]/[PVP]
3.6	71.5	10	0.0503	0.36
3.6	71.5	5	0.0503	0.72
3.6	71.5	1	0.0503	3.60
3.6	71.5	0.8	0.0503	4.50
3.6	71.5	0.6	0.0503	6.00
3.6	71.5	0.4	0.0503	9.00
3.6	71.5	0.1	0.0503	36.00

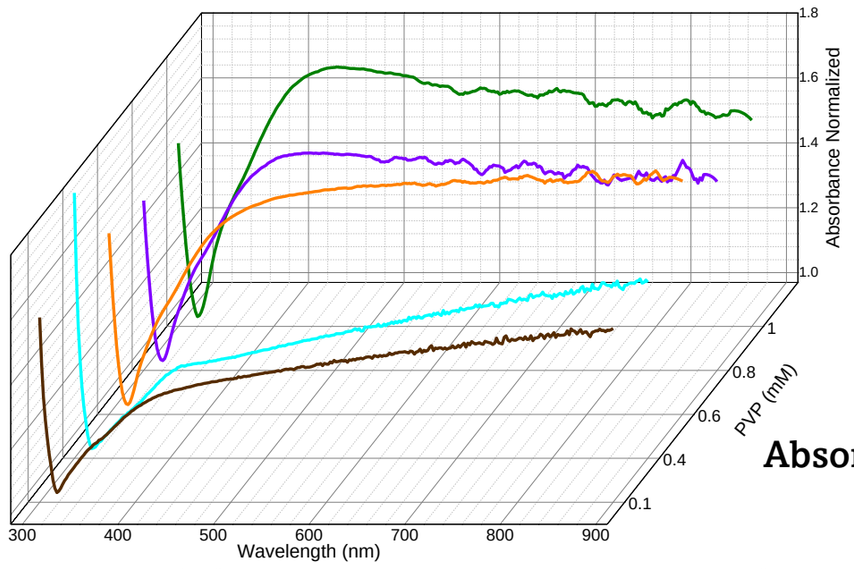


Figure 1. Absorbance of Ag nanostars

PVP:1mM | PVP:0.8mM | PVP:0.6mM | PVP:0.4mM

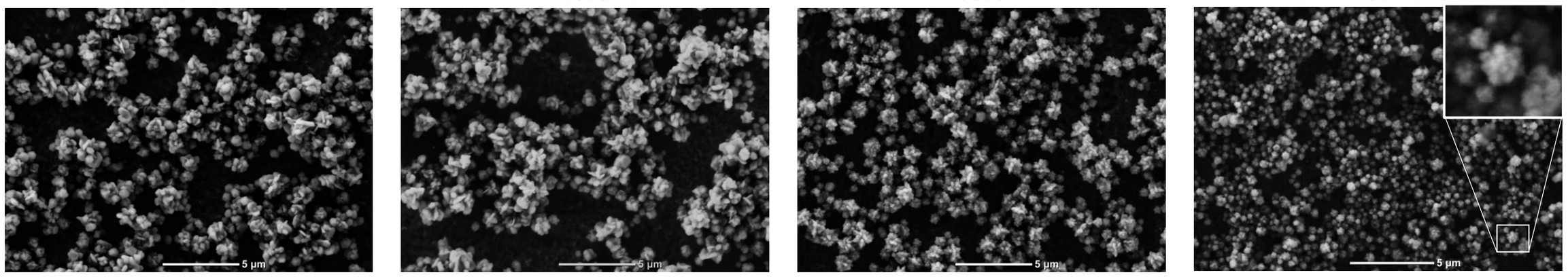


Figure 2. SEM micrographs of Ag nanostars synthetized with concentration from 1 to 0.4 mM of PVP, silver nitrate and ascorbic acid.

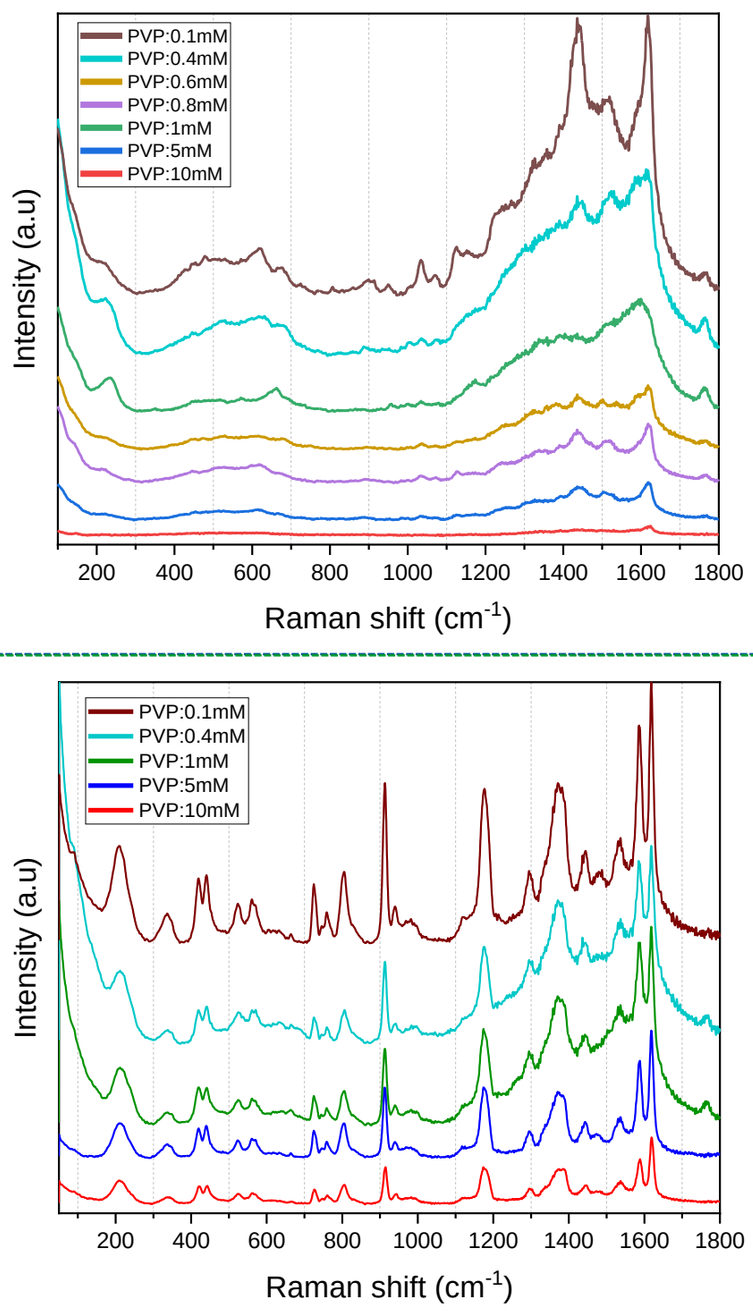


Figure 3. SERS detection of Methylene Blue by Ag nanostars.

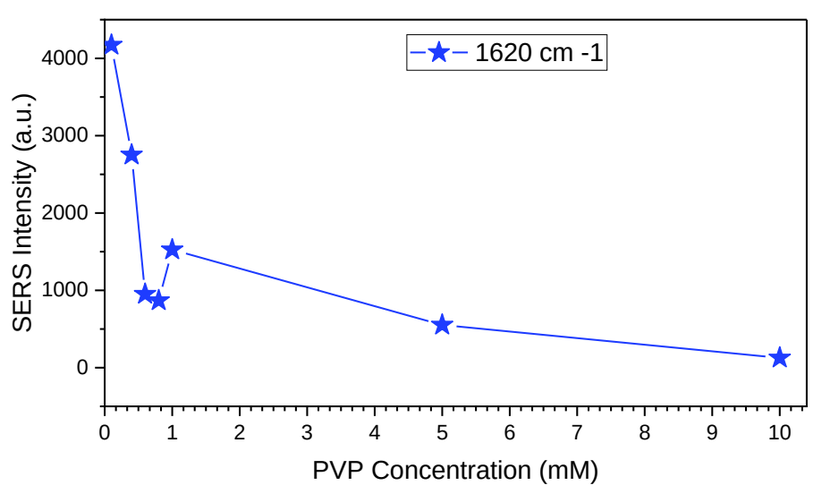
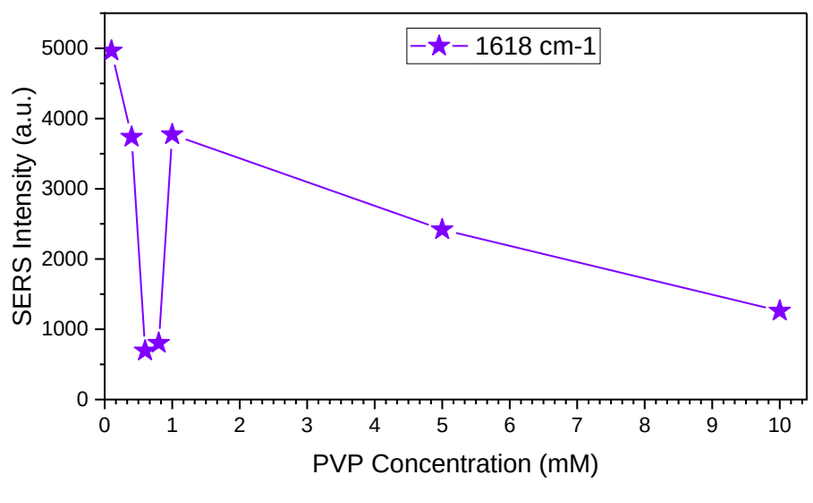


Figure 4. SERS detection of Crystal Violet by Ag nanostars.



CONCLUSIONS

It was observed that the diameter of the nanostars decreases when the PVP concentration decreases.

Methylene Blue and Crystal Violet were detected at a concentration of 1x10^-6 by SERS measurements, where it was observed that better intensities are obtained at lower concentrations.

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