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Green synthesis of silver nano-particles using *Carica papaya* juice their characterization

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Silver is a precious metal famous for its conducting and antibacterial properties. Nano form of silver is more active than the colloidal form because of its large surface area to volume ratio. [1] Nano-silver is synthesized using physical, chemical, laser ablation, phyto-chemical, microwave irradiation and biosynthetic techniques. Among these biosynthetic and phyto-chemical methods (also known as green routes) are more fascinating because of their low energy needs and eco-friendly nature. The green route of synthesizing nano-Ag particles is a single step process which uses biomaterials like plant materials (extracts from stem, root, leaf, latex, flower and seed) and microorganisms (fungi, bacteria, and algae) as reducing agent converting $Ag+$ to Ag^0 and as stabilizing agent which prevents nano-Ag particles from agglomeration and low concentration aqueous solution of $AgNO_3$ as a precursor. Plant chemicals mediated synthesis is preferable over microbial mediated because of its ease in use. [2]

In this research, un-ripened *Carica papaya* fruit extract and 1mM $AgNO_3$ solution as precursor. Polyvinylporrolidone (PVP) has been used as the stabilizing agent Optical properties of synthesized nano-particles are studied with UV-Visible spectrophotometer. Generally nano-particles show SPR (Surface Plasmon Resonance) peak in between the wavelength range of 400- 500nm due to the free electrons present on the surface. The Papaya-AgNPs showed the SPR peak at 405nm. Effects of silver-ion concentration and irradiation with normal sunlight and LED light are investigated.

The synthesized nano-Ag particles are characterized by UV–visible spectroscopy, Energy Dispersive X-Ray spectroscopy (EDX), scanning electron microscopy (SEM) and Fourier Transform Infrared (FTIR) spectroscopy.

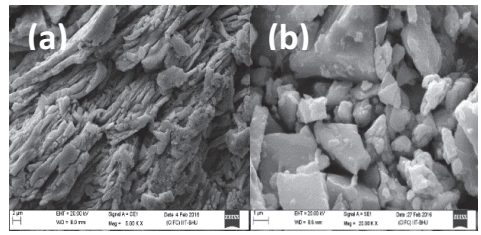

Figure 1: SEM photographs of Papaya-AgNPs and Papaya-PVP-AgNPs

In Figure 1, Papaya mediated AgNPs are shown in which particles got agglomerated probably due to insufficient stabilizing agents in the extract.[3] In Figure 1b, photomicrograph of Papaya-PVP-AgNPs is shown in which particles agglomeration is very less.

EDX results depict that Ag is present in maximum (table 1).

Table 1: EDX analysis results

	Papaya- Ag		Papaya-PVP-Ag	
s. no	Element	Weight%	Element	Weight%
1.	Cl K	18.31	C K	13.10
2.	Ag L	81.69	Ag L	86.90

Further studies on the synthesis of nanoparticles with different concentration of PVP and antifungal activity of particles are being performed.

References

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