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EDITORIAL

Wealth from Pomgranate Peel & Wood Shavings

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In accordance to a study, pomegranate peel is not a waste after all; it can be used to make synthesize nanoparticles of precious metals (viz. gold and silver). These are ultra small particles ranging 1-100 nanometers (a nanometer is a billionth of a meter) and find extensive use in biomedical and electronic devices. Most process for the synthesis of nanoparticles is complex and involve harmful chemicals. A joint research team from Patna University and Magadh University in Bihar and Aveiro University in Portugal has developed this eco-friendly method which does not even require heating. Certain plant-based processes have been developed for synthesizing gold and silver nanoparticles in the past but no previous study has ever explored the potential of food waste such as discarded pomegranate peel for the purpose. The findings of the study have been published in the November 2012 issue of *Advance Materials Letters.* Pomegranate peel extracts are rich in chemical compounds like alkaloids and poly-phenol. The researchers have found that ellagic acid, a phenol found in fruits, can stabilize silver and gold nanoparticles in water. For the experiment, pomegranate peel extract was prepared. Washed, fresh pomegranate peel was added to ultrapure water and boiled for 15 minutes. The solution was filtered to obtain pure extract. It was observed that when extract was added to silver nitrate, the solution turned yellowish-brown in an hour indicating the formation of nanoparticles. When the extract was added to chloroauric acid, the solution formed gold nanoparticles and turned pink-red in colour after an hour. Both types of were in spherical in shape. Silver ones were five nanometers in size and gold ones were ten nanometers. "Stable nanoparticles were formed within an hour of the reaction. This is one of the fastest ecological methods to produce silver and gold and silver nanoparticles using fruit waste," stated lead researcher Seema Sharma of the Anugarh Narayan College of Magadh University in Bodh Gaya.

Across the globe hundreds of tones of wood enter the waste stream daily. Some of it finds use in the renewable energy sector, pulp and paper industry, wood-based boards and animal bedding; the rest goes into landfills. A new use for waste wood – as a vehicle for delivering nutrients to plants has been found. A study, published online on October 25 in *Nanoscale,* shows that a type of nanoparticles, known as carbon nano-onions, obtained from wood shavings can promote plant growth. Lead researcher Sabyasachi Sarkar, former head of chemistry department at IIT Kanpur, stated since nano-onions are carbon-based they are non-toxic and safe for living systems.

"Carbon is an essential element of all molecules in our food. We have tested the particles on fruit flies, roundworms and bacteria. These do not show any toxicity," states Sarkar. The method involves synthesis of carbon nano-onions from wood without using any toxic metal catalyst. Wood is formed of cellulose, which is mostly carbon and water. When wood shavings are heated in absence of oxygen, a process known as pyrolysis, the water is driven away, leaving extremely thin carbon layers befind. Several such layers can curl up one-inside-the-other, forming multi walled nanotubes. When cut in small pieces, these multi walled nanotubes take the shape of a ball with concentric layers of carbon. Due to a similarity with the layers of an onion, the structure is known as carbon nano-onions. It was found that spongy carbon nano-onions, thirty nanometers in size, can trap micro-nutrients like iron cobalt, copper and zinc in their peripheral layers. These nutrient loaded nanoparticles can enter the plant surface and slowly release the nutrients as they move inside. It was shown that gram plants to which these carbon nano-onions were added indicated overall higher growth, increased flowering and enhanced fruit productivity in comparison to those grown without the nano-structures. "More work needs to be done to confirm that nano-onions are indeed non-toxic to soil microorganisms too., but it is certainly a very promising studem" stated Maria Derosa, associate professor at the Institute of Biochemistry, Carleton University, in Canada.[Courtesy: Raghunanadan, V. *DTE, CSE,* November 16-30, 2012; Chowdhary, S. *DTE, CSE,* January 1-15, 2013].