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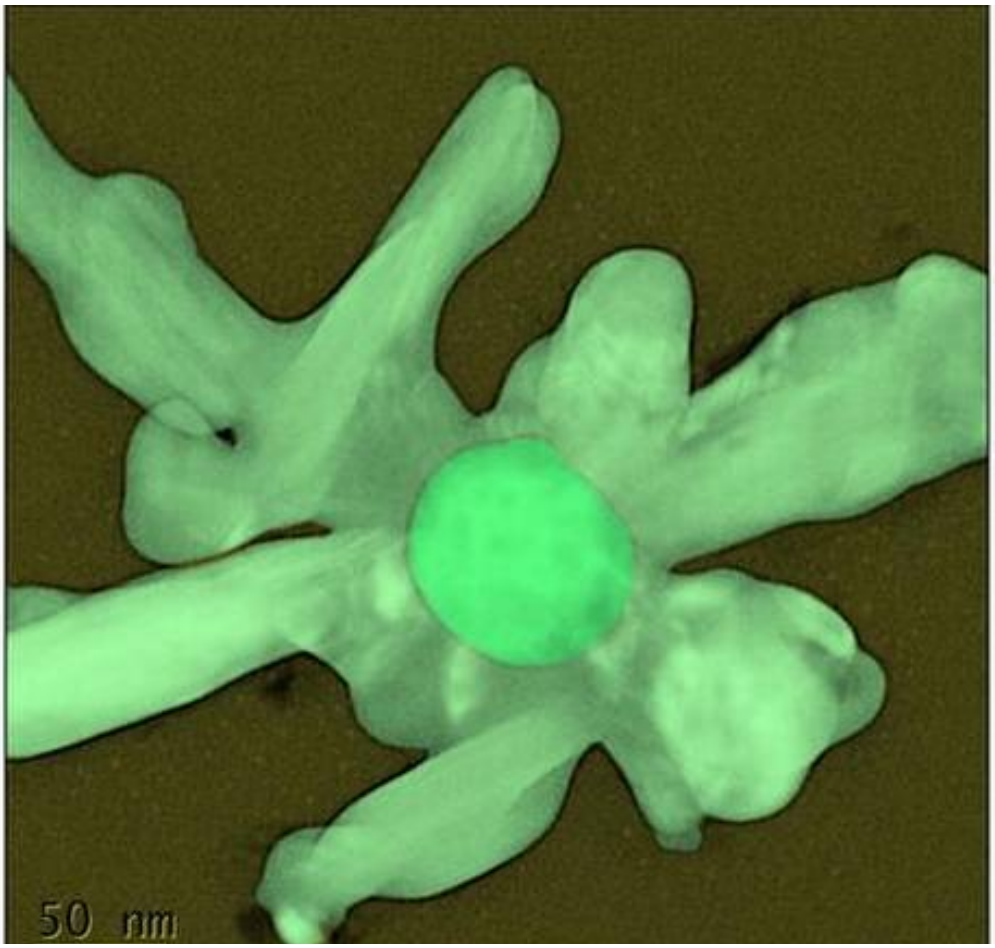
Banana plant provides fillip for nanoscience research



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Quest to develop chemical sensors for early diagnosis of cancer

Scientists working at the cutting edge of nanoscience research are turning to the humble banana plant in their quest to develop chemical sensors for early diagnosis of cancer and trace-level detection of pesticides and food adulterants.

A research team at the CSIR National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram, has developed a novel method of using banana fibre to synthesise silver nanostructures for ultrasensitive detection of chemical molecules.

The team, led by Saju Pillai of the Materials Science and Technology division at the CSIR-NIIST, has succeeded in synthesising flower-shaped silver nanoconstructs from biodegradable nano cellulose fibres (NCF) extracted from banana pseudostem. According to Dr. Pillai the nano cellulose fibres acted as agents to tune the formation and growth of the branched nanostructures. The findings have been published in the journal *ACS Applied Materials and Interfaces*.

An aqueous silver colloid (suspension) prepared from the nanostructures was used as a platform for Surface-Enhanced Raman Spectroscopy (SERS), considered to be the most powerful method for sensitive detection of chemicals. During tests, the colloid succeeded in detecting a small molecule like p-aminothiophenol.

Earlier attempts to synthesise branched nanostructures were based on the use of corrosive shape-directing agents like halides or toxic solvents. “The nanocellulose fibre derived from banana waste offers a green alternative to this method,” Dr. Pillai says.

The researchers used the Tempo-oxidation method to extract the nano cellulose fibres, followed by sequential addition of trisodium citrate to synthesize the flower-shaped nanocrystals.

Generally, silver nanostructures are unstable because of their small size and high surface energy, due to which the particles are prone to aggregation. However, the colloid prepared from silver nanocrystals proved to have overcome this handicap.

According to the report, the new findings are expected to add value to natural fibres and aid the development of diagnostic SERS probes for the early detection of cancer, Alzheimer's disease and environmental pollutants.

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