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## Nanotech for a glass of clean drinking water

By [The India Links](#) on May 7, 2013 3:15 am in [News](#) / [no comments](#)

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A team led by an IIT-Madras professor has devised a cheap and effective method to produce clean drinking water.

It will soon be possible to produce 10 litres of water — free of bacteria and virus — at just Rs. 10-12 per month, for the daily consumption of a family of five.

Prof. T. Pradeep of the department of chemistry at IIT-M and his team have made use of silver nanoparticles to achieve this feat.

Apart from being affordable, silver nanoparticles coated on a composite do not require electricity or hydrostatic pressure to produce potable water.

They can operate at ambient temperatures ranging from 5-35 degrees Celsius, according to a paper published on May 7 in Proceedings of the National Academy of Sciences. The production of the nanoparticle matrix is also environment-friendly.

The technology is based on sustained release of about 50 parts per billion (ppb) of silver ions in a large volume of water to kill microorganisms.

The amount of silver ions released is well below the maximum



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permissible limit of 100 ppb.

Silver ions are known for their ability to destroy the integrity of cell membranes and damage DNA.

To achieve sustained release of silver ions, Prof. Pradeep's team first prepared a composite of aluminium oxy-hydroxide on which silver nanoparticles were deposited.

"Each box is 50 nanometre (nm) long and 20-30 nm wide. The boxes are connected together by bio-polymer reinforcement," Prof. Pradeep told The Hindu.

Each box has two sides open which allows water to flow through them. "Not every box, however, is coated with the nanoparticles," he said.

The composite with silver nanoparticles is in the form of sand grains.

"A composite granule will have millions of nanoboxes and many of the boxes will have silver nanoparticles embedded on them," he said.

The reason behind the sustained release is that silver nanoparticles are much more active than bulk silver, and hence they are much more unstable. The instability arises from being bound to fewer atoms.

The nanoparticles are trapped within the composite such that they have 'reduced contact' with agents that tend to form scaling but still have sufficient 'interaction' with water to continuously release silver ions.

Despite this, scaling forms on the nanoparticles after a period of time and the performance declines. But reactivation (release of silver ions) can be achieved by heating the composite at 70-100 degrees Celsius for 3-4 hours.

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“The consumer can use the filter for a year before reactivating it. It can be run for six cycles (six years),” Prof. Pradeep said.

The use of carbon filter at a second stage helps in removing particulate matter, organic and bacterial biomass and traces of silver ions.

Trials showed that composites made of specific materials were capable of removing contaminants like iron, lead and arsenic.

In the case of arsenic, 20 gm of composite kept in 400 litres of water reduced the chemical content from one part per million (ppm) to less than 10 ppb in the output water.



**Read full article:** <http://www.thehindu.com/opinion/editorial/article3808391.ece>

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