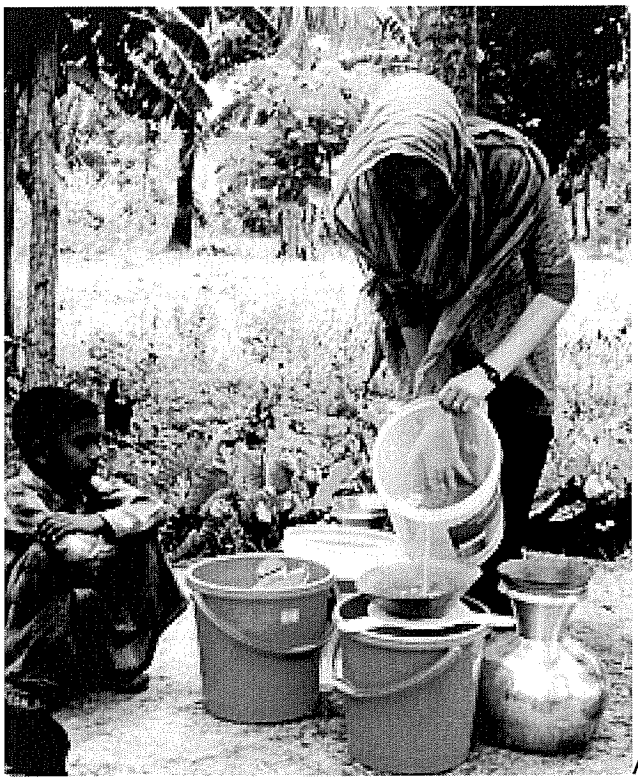
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Pages with Nanoparticles Help Filter Water

Greg Watry, Digital Reporter



As a graduate student, Theresa Dankovich was following in McGill Univ.'s pulp and paper research tradition when she developed a book, with pages capable of purifying water by killing waterborne bacteria through nanotechnology.

Her research was originally sponsored by Sentinel: Bioactive Paper Network, which aimed to design paper with antimicrobial effects for air and water filtration, among other uses.

"I have a copy of The Drinkable Book with me," said Dankovich, now of Carnegie Mellon Univ., at the 250th National Meeting & Exposition of the American Chemical Society.

"It looks like a regular book," she said. As she flipped from the gray cover to the interior, she noted the consistency of the pages, bright orange and thick. In appearance, they resembled parchment. On the conference table was a silver-colored water vessel, with a conical-shaped piece of paper from The Drinkable Book in the opening.

According to Dankovich, purification is achieved when water passes through the silver- and copper-nanoparticle paper. Silver has long been known for its antibacterial effect. In 400 BC, Greek physician Hippocrates [1] described its unique antibacterial property.

Though Daknovich started out with silver nanoparticles at McGill, she eventually added copper while she was continuing her research at the Univ. of Virginia's Center for Global Health.

Field investigations followed, and she traveled to South Africa, Ghana, Haiti and Kenya.

"In Africa, we wanted to see if the filters would work on 'real water,' not water purposely contaminated in the lab," she said [2]. "One day, while we were filtering lightly contaminated water form an irrigation canal, nearby workers directed us to a ditch next to an elementary school, where raw sewage had been dumped. We found millions of bacteria."

The Drinkable Book's pages achieved 99.9% purity with the sample.

"Some silver and copper will leach from the nanoparticle-coated paper, but the amount lost into the water is within minimal values and well below the Environmental Protection Agency and World Health Organization drinking water limits for metals," she said.

In total, the pages have been tested on 25 different water sources in five countries, according to pAge Drinking Paper [3], a nonprofit company started by Dankovich.

"People seem to be interested in the fact that it's a very simple thing," she said. "It's not like it involves pumps, or you have to plug something in. It's just pouring into a container."

Scaling up production is one of Dankovich's current goals, as most of the pages she's made by herself, or in the oven of a church kitchen. The oven is used in a heat treatment step in the paper's production.

According to the nonprofit, Dankovich has created enough pages for five books, which took over 60 hrs of work.

Further, she wants to design an indicator system to let users know when to replace the paper.

• CONFERENCE AGENDA ANNOUNCED:

The highly-anticipated educational tracks for the 2015 R&D 100 Awards & Technology Conference feature 28 sessions, plus keynote speakers Dean Kamen and Oak Ridge National Laboratory Director Thom Mason. Learn more. **[4]**

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