Low-cost fibers remove trace atrazine from drinking water

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A new generation of high surface-area porous materials for removing atrazine from water supplies has been developed by researchers at the University of Illinois at Urbana-Champaign. The low-cost and wear-resistant fibers also can remove the hazardous contaminants chloroform and trichloroethylene, both byproducts of the commonly used chlorine disinfection process.

“We’ve shown that we can remove all these impurities to well below the maximum contaminant levels established by the Environmental Protection Agency,” said James Economy, a professor of materials science and engineering at Illinois. “Having increased pore size and higher surface area, these fibers work much better than commercially available granulated activated carbon.”

Atrazine is one of the most widely used herbicides in the United States. More than 75 million pounds of atrazine are applied annually. Spread on farm fields and residential lawns to control weeds, atrazine can work its way into local waterways and municipal drinking supplies. Millions of Americans unknowingly ingest atrazine with their tap water.

“Because atrazine is toxic to humans, the Environmental Protection Agency has established a maximum concentration level of three parts per billion,” Economy said. “By tailoring the pore size and pore surface chemistry of our fibers, we can achieve this limit.”

To make their fibers, Economy and Illinois research scientist Zhongren

Yue begin by coating fiberglass assemblies with a polymeric solution and a chemical activation agent. Then, under mild heat, the polymer cross-links, creating pores about 10-30 angstroms in size. By controlling the chemistry, the scientists are able to tailor the fibers for specific target molecules, such as atrazine.

“Our chemically activated porous fibers are nearly eight times more effective at removing atrazine to below EPA standards than commercially available activated carbon,” Economy said. “In fact, our fibers can remove atrazine to well below one part per billion. And our fibers can be easily regenerated under modest conditions.”

Yue will discuss the fibers and present the latest test results at the 228th American Chemical Society national meeting in Philadelphia. The technology has been patented.

Source: University of Illinois at Urbana-Champaign