Functional textiles can filter air & water: Research

Functional textiles made by infusing cotton with a beta-cyclodextrin (BCD) polymer can clean pollutants from air and water, according to a recent research. Cotton fabric was functionalised by making it a participant in the polymerisation process and the addition of the fibre to the reaction resulted in a unique polymer grafted to the cotton surface.

The research conducted at the Cornell University was detailed in the paper 'Cotton Fabric Functionalized with a ß-Cyclodextrin Polymer Captures Organic Pollutants from Contaminated Air and Water' that was published on 'Chemistry of Materials, an American Chemical Society journal'.

Scanning electron microscopy showed that the cotton fibres appeared unchanged after the polymerisation reaction. When tested for uptake of pollutants in water (bisphenol A) and air (styrene), the polymerised fibres showed greater uptakes than that of untreated cotton fabric or commercial absorbents.

"We are compatible with existing textile machinery – you would not have to do a lot of retooling. It works on both air and water, and we proved that we can remove the compounds and reuse the fibre over and over again," said Juan Hinestroza, associate professor of fibre science and director of undergraduate studies in the College of Human Ecology, who worked on the research.

"There's a lot of pollution generation in the manufacture of textiles. It is just fair that we should maybe use the same textiles to clean the mess that we make," added Hinestroza.

The adsorption potential of this technique can also be extended to other materials, and be used for respiratory masks and filtration media, explosive detection and even food packaging that would detect when the product has gone bad.

The researchers who worked on the study include Hinestroza, former Cornell chemistry professor Will Dichtel, first author Diego Alzate-Sánchez from Northwestern University and former postdoctoral researchers Brian J. Smith (now an assistant professor at Bucknell) and Alaaeddin Alsbaiee (now at Arkema).

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The research is an offshoot of work done last year at Cornell by Dichtel and his group, which included Alsbaiee and Smith and was supported by grants from the National Science Foundation (NSF). It made use of the Cornell Center for Materials Research Shared Facilities, which is supported by the NSF's Materials Research Science and Engineering Centres program.

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