

NUS researchers turn waste paper into oil absorbent



An NUS student holding a piece of cellulose aerogel used to absorb oil in a beaker of water. Photo: Ooi Boon Keong

   View all 0 comments

 Like  Share 348   G+1 0  Tweet

PUBLISHED: 4:15 AM, FEBRUARY 3, 2016
UPDATED: 9:12 PM, FEBRUARY 3, 2016

(PAGE 1 OF 1) - [PAGINATE](#)

SINGAPORE — Waste paper, which is of little use to most, has been given a new lease of life by National University of Singapore (NUS) researchers: As a “super material” that can absorb oils up to four times its weight, making it useful in disasters like oil spills.

Also, its fabrication process uses 70 per cent less energy, is faster and cheaper, and produces less harmful dioxins and air pollutants, while 99 per cent of the oil absorbed can be recovered.

The new biodegradable cellulose aerogel was created after one-and-a-half years of research, and a patent was filed in 2010. The researchers, led by Assistant Professor Duong Hai Minh of NUS Department of Mechanical Engineering, then spent the next five years making the product commercially viable.

The material is expected to hit the market in May.

Asst Prof Duong, who introduced the material at a media briefing on Monday, told TODAY he was inspired after being challenged by a janitor at NUS on what could be done with waste paper he threw out.

“The idea of using paper waste came in my mind from this conversation. Paper waste was abundant in my department and in Singapore, and I wanted to use the waste for the environmental treatment,” he said.

Aerogels are among the lightest solid materials known to man, and possess good heat insulation as well as liquid absorption qualities, but commercial aerogels are commonly made from silica, which is not environmentally-friendly.

Cellulose aerogels are naturally hydrophilic and have the ability to absorb liquids up to four times its weight, and being derived from waste paper, it is biodegradable and does not use harmful chemicals in its production.

If treated with methyltrimethoxysilane (MTMS), a chemical compound that gives the aerogel water-repellent qualities, cellulose aerogels will selectively absorb non-polar liquids such as oil only.

The researchers found that MTMS-coated cellulose aerogels can absorb oil up to 99 times its dry weight, making them four times as effective as oil sorbents currently available in the market. They can be reused and squeezed to recover over 99 per cent of oil absorbed.

At the end of its useful life, they can be safely ground into fine particles and scattered on the ground to accelerate the natural biodegradation process.

Asst Prof Duong also noted that cellulose is low cost and makes up 75 to 85 per cent of recycled paper.

The technology was licensed by the NUS Industry Liaison Office to a company called Bronxculture in November last year, with manufacturing facilities located in Vietnam.

The cellulose aerogel can be used to make products such as thermal insulating materials for buildings, packaging, and winter jackets, as well as reusable oil absorption products. Other potential applications include first-aid plugs for wounds, make-up removers, and diapers.

Noting the burden of paper-related waste on the environment, Asst Prof Duong said he hopes to turn recycled waste into even more useful products, and contribute towards environmental conservation.

CLIFFORD LEE