

Press release**Technische Universität Graz****Philipp Jarke**

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<http://idw-online.de/en/news848150>Research results
Environment / ecology
transregional, national**Researchers at TU Graz Turn Textile Waste into Paper**

Until now, old clothes have mainly been incinerated. Using adapted processes from paper production, it is possible to recover the cellulose fibres from used clothing and use them to produce cardboard and other packaging materials.

In Austria alone, around 220,000 tonnes of textile waste are produced every year, of which almost 80 per cent is incinerated. As a result, valuable raw materials are irretrievably lost. A team led by Thomas Harter from the Institute of Bioproducts and Paper Technology has come up with a sustainable solution to this problem. The researchers have developed a process to recover the fibres from cotton-based used textiles and use them to produce paper for packaging materials. Compared to conventional recycled paper, the paper with textile fibre content proves to be significantly stronger.

“Strictly speaking, the conversion of textile fibres into paper is a downgrade,” says Thomas Harter. “However, it has a major advantage from an environmental point of view. The paper cycle is highly closed, with recycling rates of over 90 per cent in the packaging sector. If we bring valuable textile fibres into this cycle, they remain usable for a long time.” Recycled textiles can be an important source of raw materials for the production of packaging paper and help to reduce the amount of paper imports currently used for this purpose.

Very similar to normal papermaking suspension

To make paper from old items of clothing, the clothing is first cut into small shreds and soaked in an aqueous solution. This mixture of water and shreds is milled to separate the interwoven cotton fibres without knotting or clumping. As part of his master’s thesis, Alexander Wagner determined the most suitable beating machine, the necessary processing time and the optimum ratio of water to textiles in order to extract the maximum amount of usable fibres from the textile waste. “At the end of our tests, we obtained a suspension that is very similar to a normal papermaking suspension and that we can process into paper using established methods,” says Thomas Harter.

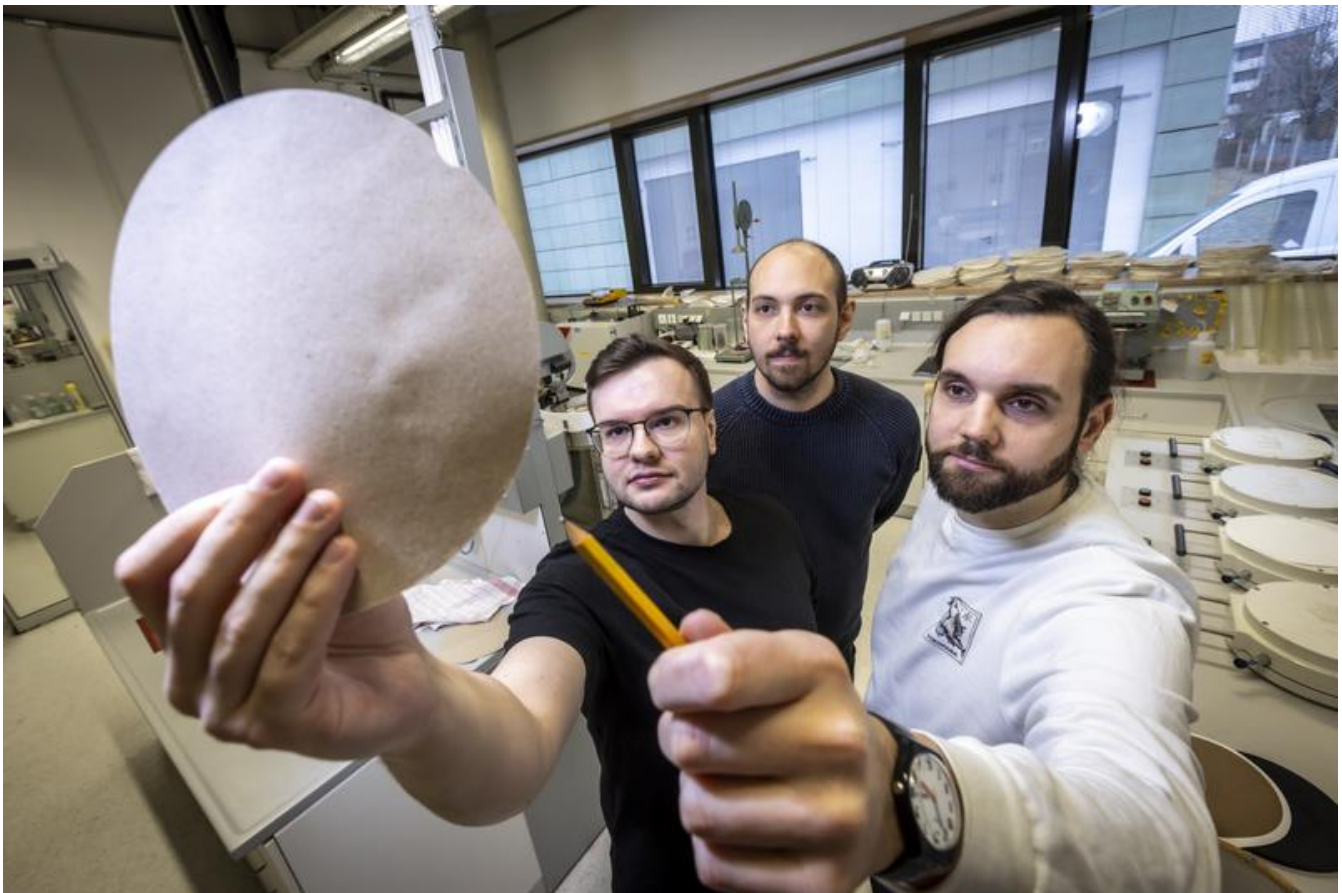
Significantly more tensile strength than conventional recycled paper

Visually, the paper with textile content hardly differs from ordinary recycled paper; it is slightly brownish with occasional coloured speckles, which come from coloured items of clothing. However, these splashes of colour are irrelevant for cartonboard and other packaging materials. Tensile tests have shown that the addition of textiles increases the strength of recycled paper: “Even with a textile-based proportion of 30 per cent, the paper is significantly stronger, while the processability remains the same,” says Alexander Weissensteiner, who is also working on optimising the recycling process as a master’s student. This is due to the length of the fibres: “The fibre lengths of recycled waste paper are quite short. At 1.7 millimetres, our recycled textile fibres are significantly longer.”

The researchers' next goal is to reduce the energy consumption of the beating process. In addition to additives such as light acids and alkalis, they also test enzymatic pre-treatments to support fibre disintegration in the beating unit. "We also want to take the next scaling step and implement the process on industrial devices," says Thomas Harter.

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Alexander Weissensteiner, Alexander Wagner and Thomas Harter (from left) with a paper sample consisting of 30 per cent recycled cotton fibres.

Helmut Lunghammer
Lunghammer - TU Graz



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