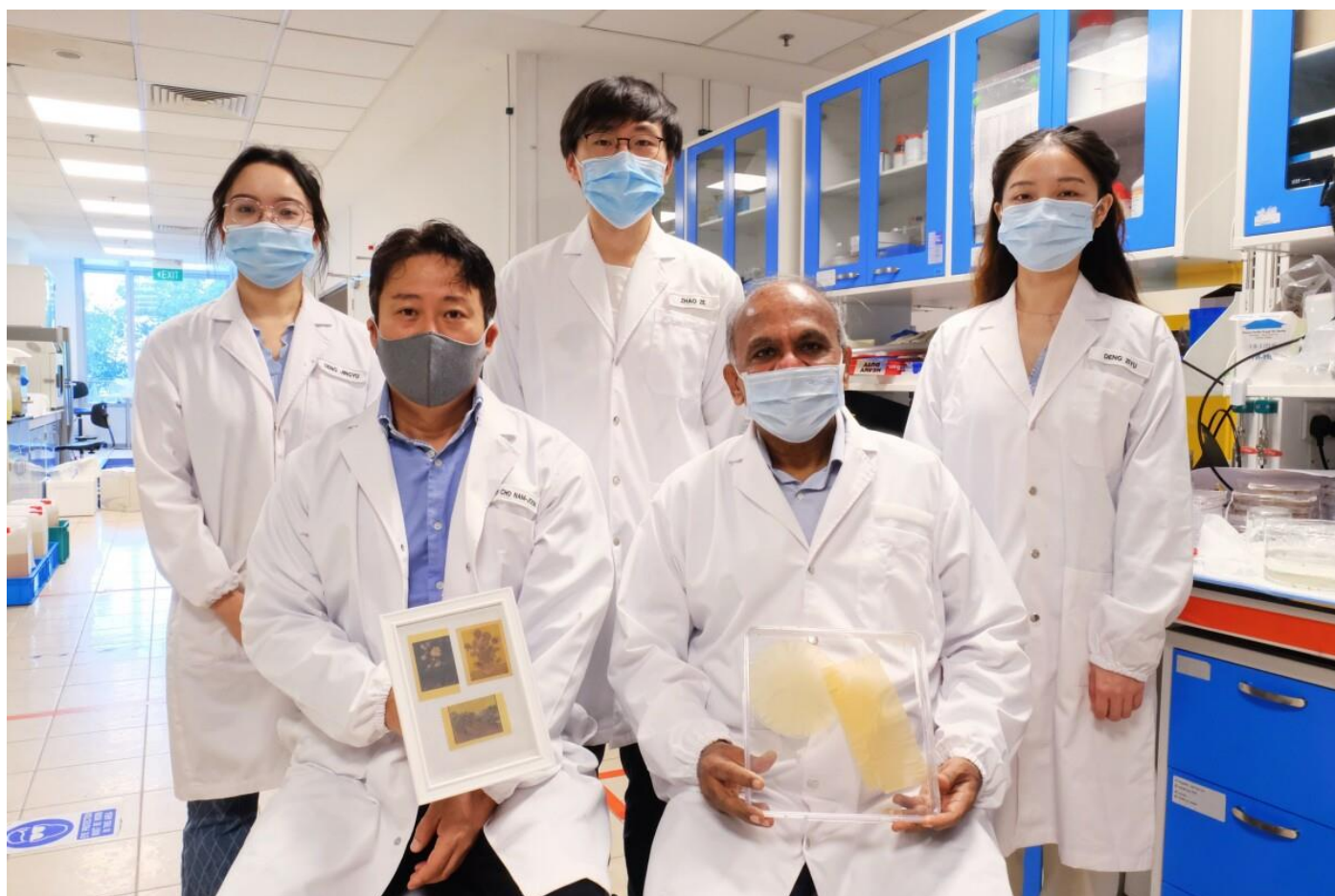


ENVIRONMENT

Sunflower pollen used to create chemically erasable, rewritable paper

By Ben Coxworth
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The NTU Singapore research team, with samples of the pollen-based paper
NTU Singapore

While the recycling of paper is all very well and good, reusing it is even better. A new pollen-based paper was designed with this fact in mind, as text can be printed onto it and then chemically erased multiple times.

The experimental material is being developed at Singapore's Nanyang Technological University, utilizing a variation on a technique which we [first heard about](#) two years ago. Described as being similar to the making of soap, the process begins with potassium hydroxide being used to remove the tough outer casing from sunflower pollen grains.

<https://newatlas.com/environment/sunflower-pollen-erasable-paper/>

A gel made up of the grains' soft interior substance is left behind, and is purified via a wash in deionized water. That gel is then poured into a flat mold and left to air-dry. Once it has dried into a 0.03-mm-thick sheet, it's treated with acetic acid, to render it insensitive to moisture.

The resulting paper is floppier and more translucent than traditional wood-pulp-based paper, but it can still be fed through an ordinary laser printer and printed upon using conventional toner. Text and images remain on the paper even when adhesive tape is applied to the material and then peeled off, or when the paper is placed in water.

That said, if the paper is immersed and gently rubbed in an alkaline solution for two minutes, the gel swells up, causing the layer of toner to disintegrate and flake off. The now-blank paper is then placed in ethanol for five minutes – to shrink the gel back to its previous state – after which it's air-dried and re-treated with acetic acid.

It can then be printed on again, without any loss in its integrity or the quality of the printed images. The process can be repeated eight times per sheet.



Unlike the case with previously developed paper-erasing systems, erasing the pollen-based paper doesn't require the use of harsh solvents or high-intensity light, both of which could damage the paper over time
NTU Singapore

As an added bonus, the scientists state that while the production of conventional paper requires trees to be cut down, the pollen used in their paper could be gathered from crops of sunflowers on an ongoing basis. What's more, pollen from plants such as camellia and lotus could also be used, either instead of or combined with the sunflower pollen.

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A paper on the research, which is being led by Professors Subra Suresh and Cho Nam-Joon, was recently published in the journal [Advanced Materials](#). The production and erasing processes are demonstrated in the following video.



Recyclable pollen-based paper developed by NTU Singapore scientists