New sustainable, cheap, and renewable biocement is made from sludge and urine

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Talk about turning a problem into an asset.

by **Mihai Andrei** — May 17, 2022 in **Science** Reading Time: 3 mins read

Researchers from the Nanyang Technological University (NTU) in Singapore have found a way to create biocement from carbide sludge and urine, creating a mixture that is not only more sustainable, but also much cheaper.

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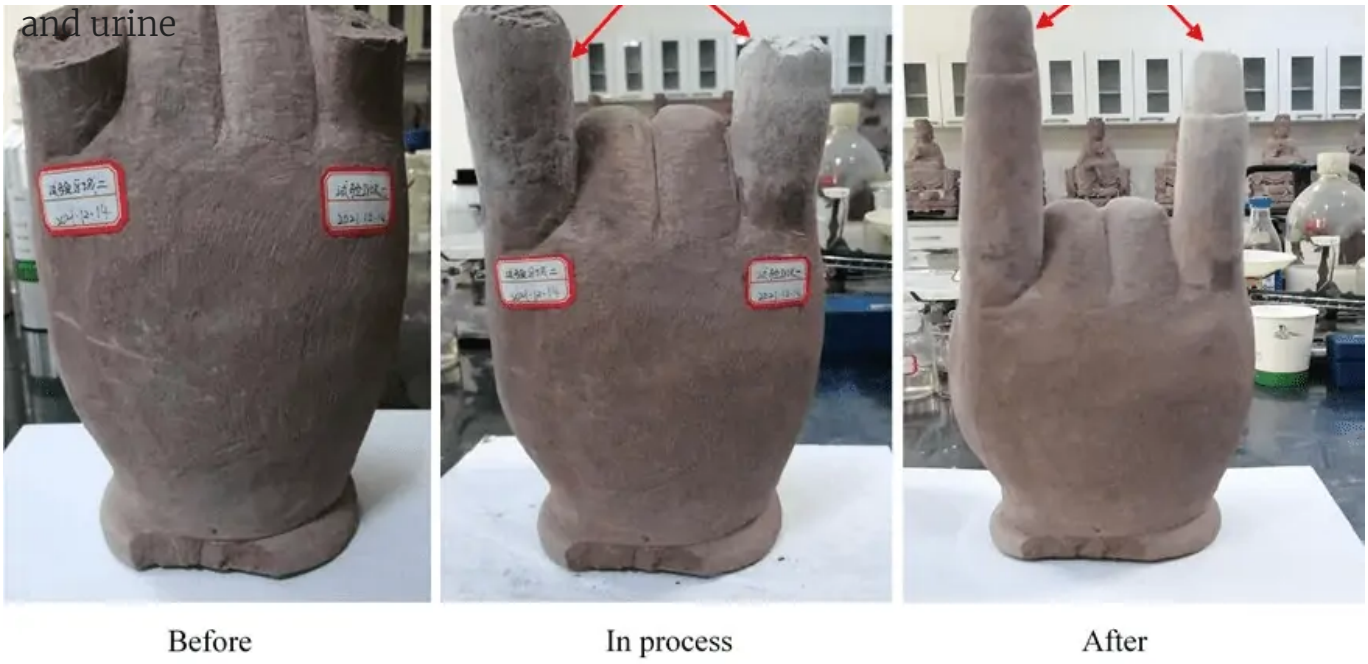

The material was tested on the reparation of a Buddha hand provided by Dazu Rock Carvings, a UNESCO World Heritage Site in China. The biocement solution is colorless, allowing restoration works to maintain the carving's original color. Image credits: Nanyang Technological University

Cement is one of the most problematic materials on Earth. It's incredibly useful — just look around you, the odds are much of what you see contains cement — but producing and using cement generates a huge amount of greenhouse gas emissions. Cement production amounts to around 8% of the total, global man-made emissions — the equivalent of a large country.

Unsurprisingly, researchers are eagerly looking for more sustainable alternatives to cement, and one such alternative is something called biocement.

Biocement is a product that relies on a clever phenomenon, stimulating native soil bacteria to connect the soil particles, creating a strong and renewable building material that almost acts

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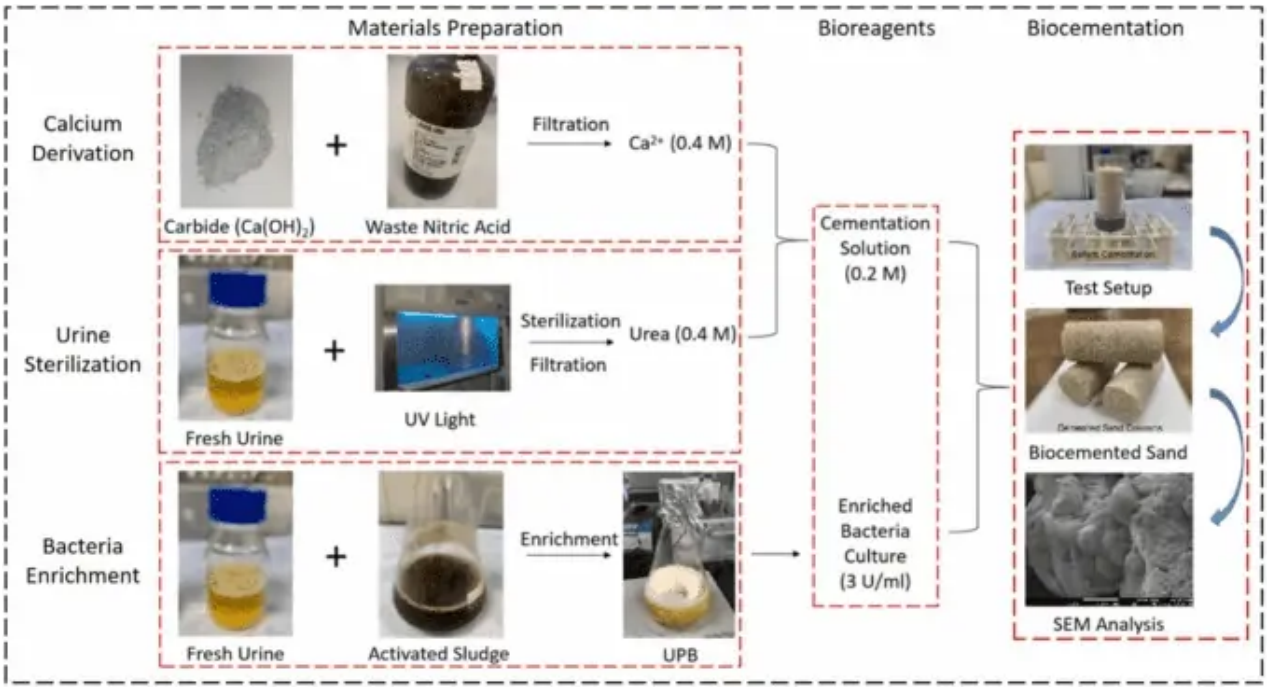
create biocement.



Flowchart of the sustainable biocement production under this study. Image credits: Yang et al

The research team, led by Professor Chu Jian at NTU, developed a process in which the urea reacts with the calcium ions in the carbide sludge to form a precipitate — a hard solid substance deposited from the mixture. The mixture binds the particles closer together, filling in the gaps between them and creating a solid mixture: the cement.

> "Biocement is a sustainable and renewable alternative to traditional cement and has great potential to be used for construction projects that require the ground to be treated," said Prof Chu, who is also the Director of NTU's Center for Urban Solutions. "Our research makes biocement even more sustainable by using two types of waste material as its raw materials. In the long run, it will not only make it cheaper to manufacture biocement, but also reduce the cost involved for waste disposal."

The developed material is not only durable and sustainable but also cost-effective. It could also be used, for instance, to control soil erosion, strengthen the ground in construction or excavation, or as a grout for cracks or monuments.