Sustainable concrete | Photo source Thomas Gamstaetter on Unsplash



# STRONGER CONCRETE MADE USING WASTE VEGETABLES

SUSTAINABILITY

## Engineers have developed a way to strengthen concrete using extracts from root waste vegetables.

Concrete manufacture is a major source of pollution. The production of Portland cement, a main ingredient in concrete, is estimated to be responsible for up to 8 percent of the total worldwide emission of carbon dioxide. At Springwise, we have recently covered several innovations aimed at reducing the carbon footprint of concrete production. Some of these have focused on using different methods to make Portland cement more sustainable by adding graphene. Now, engineers at Lancaster University, along with industrial partners at Cellucomp Ltd, have come up with another method. They have devised a way to strengthen concrete and make it more environmentally friendly by adding extracts from root vegetables.

The researchers added 'nano platelets' extracted from the fibres of sugar beet and carrots to the concrete. The work builds on earlier findings that showed the nano platelets acted to increase the amount of calcium silicate hydrate. This is the substance responsible for the strength of concrete. Additionally, the researchers estimate that adding the nano platelets resulted in a saving of 40 kilograms of Portland cement per cubic metre of concrete. This reduction in Portland cement equals to a saving of 40 kilograms of carbon dioxide per cubic metre of concrete. The nano platelets were also found to help prevent corrosion in the concrete. The researchers believe that concrete using the nano-composite will out-perform other cement additives, including graphene.

Lead researcher Professor Mohamed Saafi, from Lancaster University's Engineering Department, described the root vegetable nano-composites as having superior "mechanical and microstructure

properties", adding that, "This significantly reduces both the energy consumption and carbon dioxide emissions associated with cement manufacturing." The research project will also explore adding very thin sheets of vegetable nano platelets to existing concrete structures to reinforce their strength. At the same time, Cellucomp Ltd is developing new materials, including paints, that use the vegetable composites to increase strength and sustainability. What other materials might benefit from the addition of root vegetable nano platelets?

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