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New 3D concrete printing method captures carbon to reduce construction emissions

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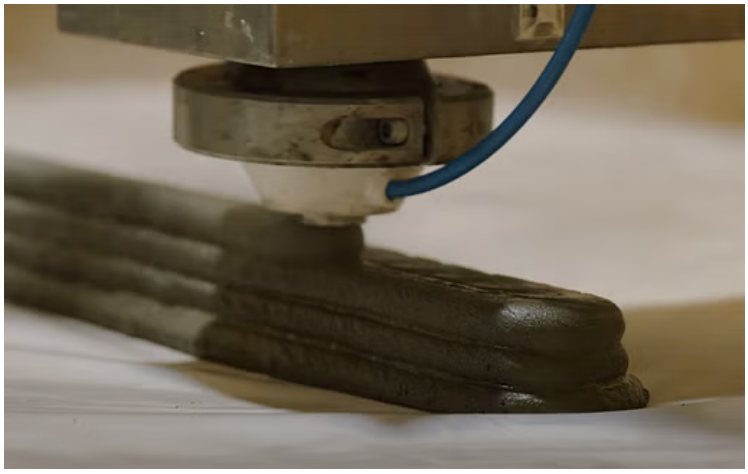

Researchers at Nanyang Technological University, Singapore, have developed a 3D concrete printing process that captures and stores carbon dioxide (CO_2) during production. The method incorporates CO_2 and steam—by-products of industrial processes—into the concrete mix, where CO_2 chemically bonds into a solid form.

The method, described in *Carbon Capture Science & Technology*, demonstrates a reduction in cement's carbon footprint, a material responsible for 8% of global CO_2 emissions. The process has shown improved mechanical properties, including a **36.8% increase in compression strength** and a **45.3% improvement in bending strength**, and traps **38% more carbon** compared to conventional 3D concrete printing.

Additional findings include:

- **Reduced Porosity**: Open porosity decreased by up to **72%**, improving durability and resistance to environmental factors.
- **Enhanced Printability**: The process improves printability, allowing structures to be built with a **50% increase in build height capacity**.

The researchers suggest that further optimization, including the use of waste flue gases instead of pure CO_2, could enhance the method's efficiency and sustainability. This technology demonstrates a viable pathway for reducing emissions while improving material performance in the construction sector.

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