



MatERIAL Group @IISc



# Maximizing Carbon Sequestration in Cement-Based Construction through Material Innovation and Additive Manufacturing



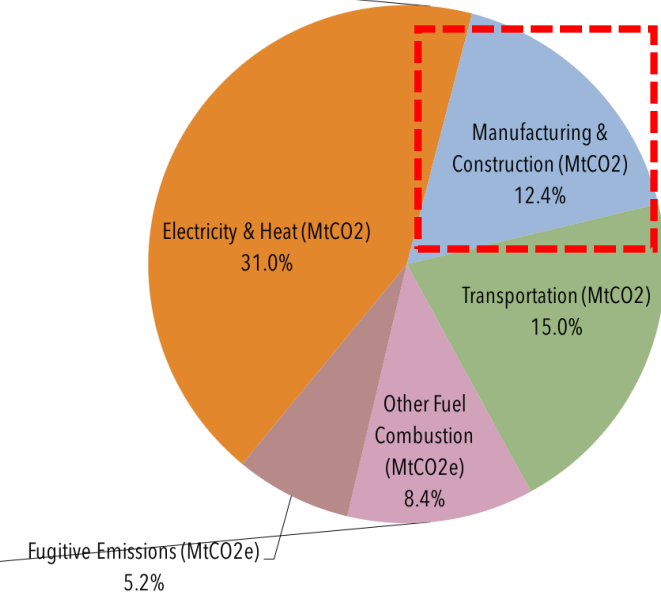
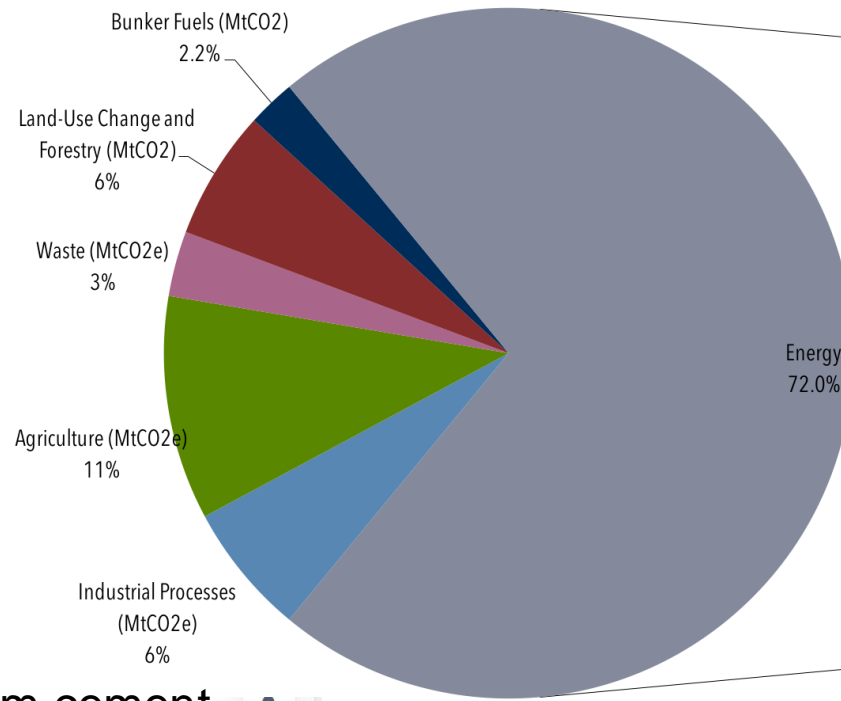
*Presenter: Dr. Souradeep Gupta,  
Indian Institute of Science, Bangalore, India*



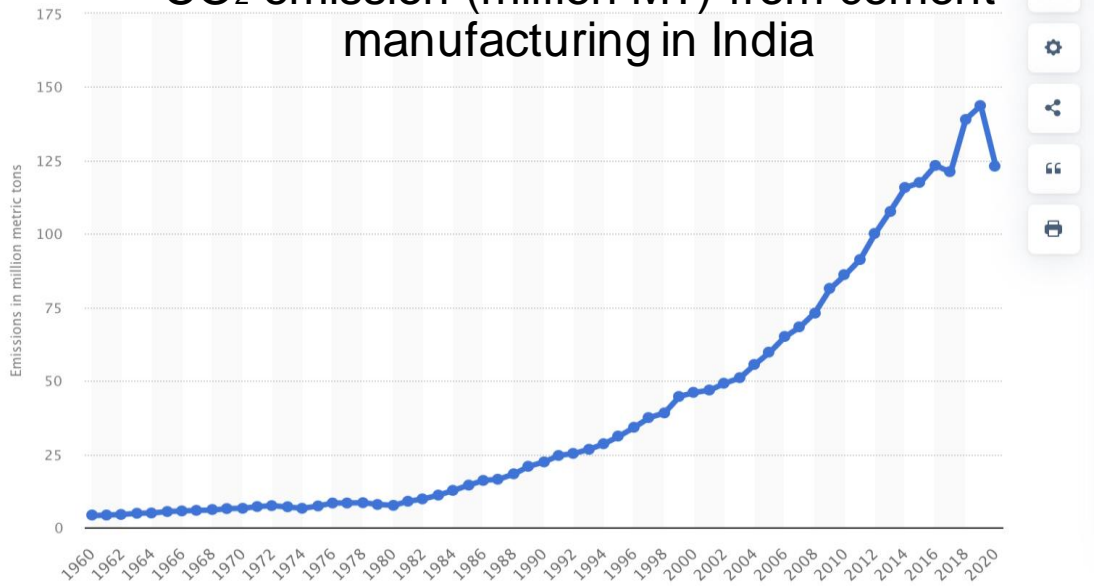


# CO<sub>2</sub> emission by sectors

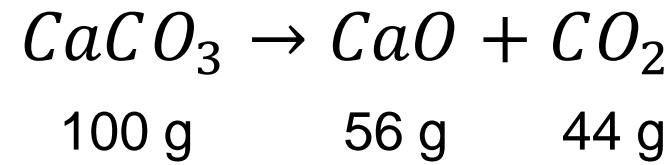
➤ Cement production accounts for 30% of global industrial CO<sub>2</sub> emissions.



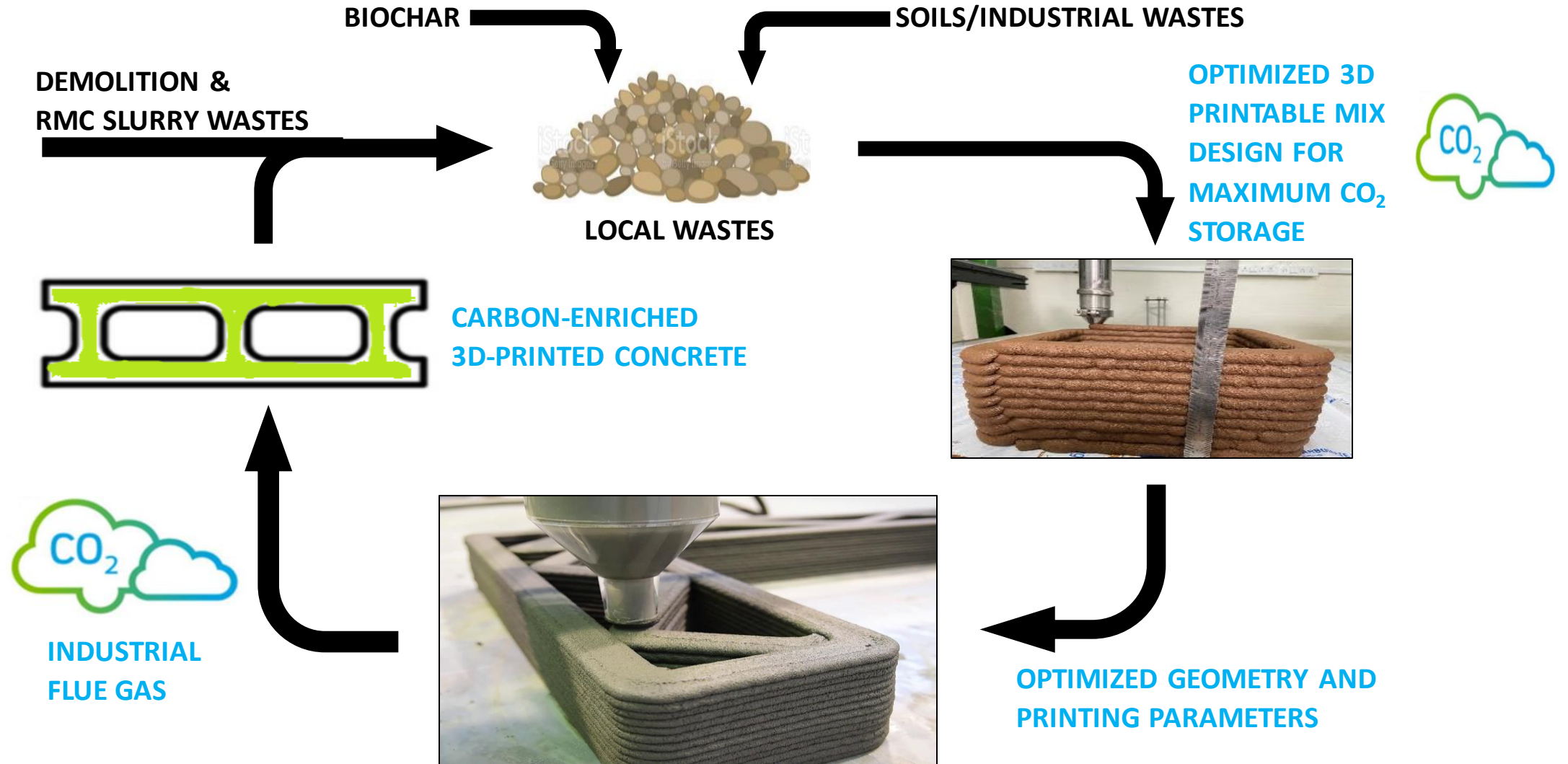
### CO<sub>2</sub> emission (million MT) from cement manufacturing in India



➤ **The conversion process of limestone into lime (process emissions)** accounts for 56% of total emission respectively associated with cement manufacturing



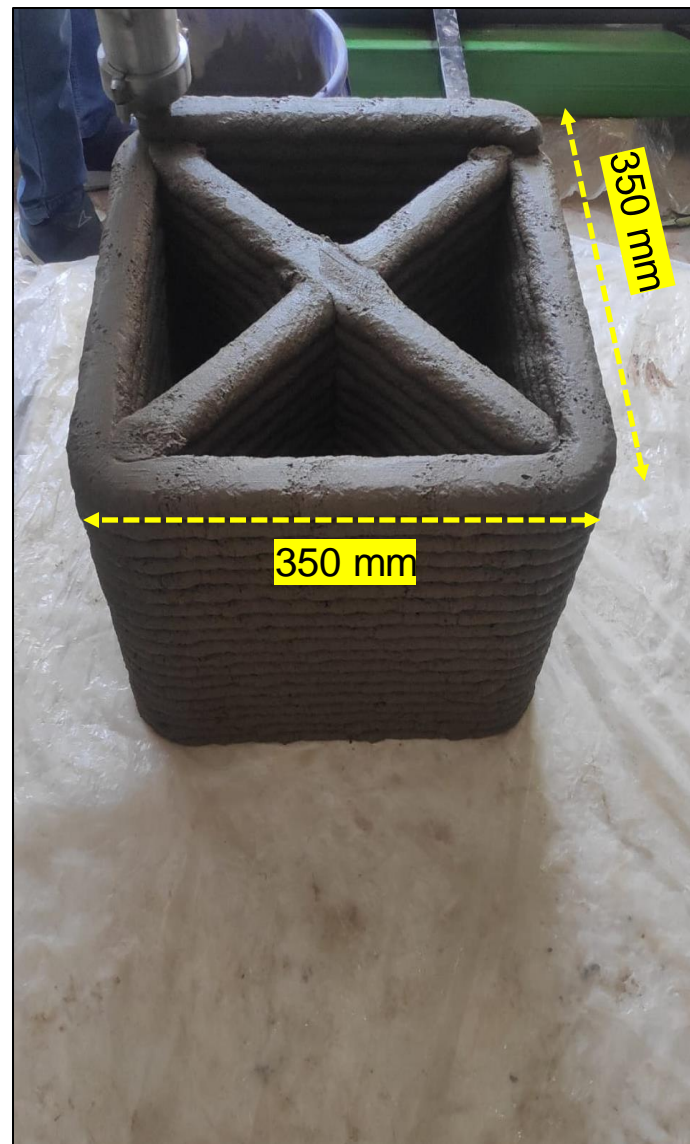
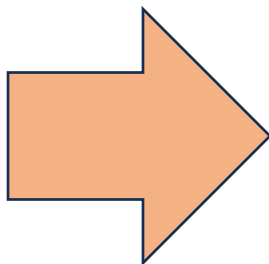
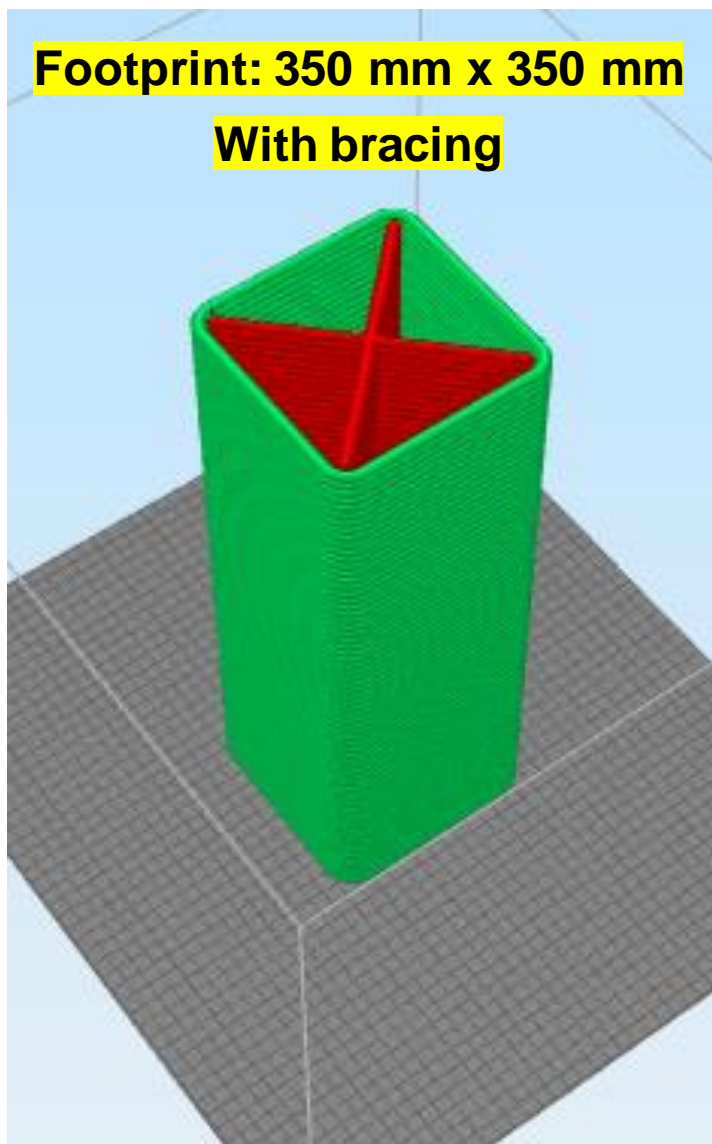
# Proposed Technology



# 3D Printing Structural Model and Printed structure

Footprint: 350 mm x 350 mm

With bracing

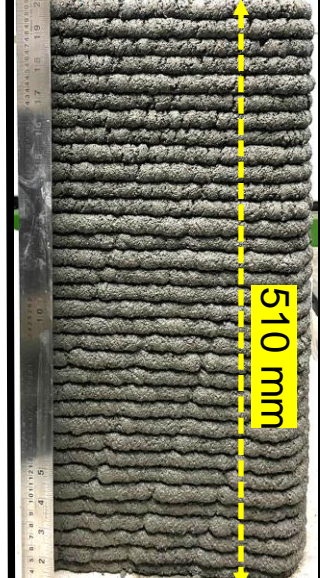


CS25F30



# 3D Printed Structures (All Mixes)

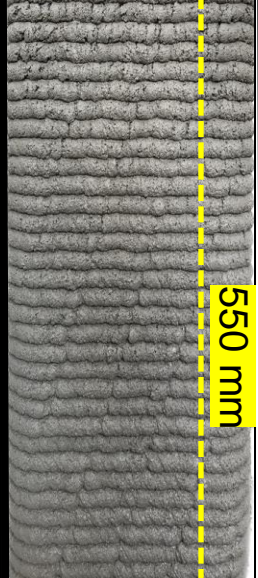
|                    |                 |
|--------------------|-----------------|
| <b>Shape</b>       | <b>Square</b>   |
| Outer Size         | 350 mm x 350 mm |
| Inner size         | 310 mm x 310 mm |
| Stand off Distance | 10 mm           |



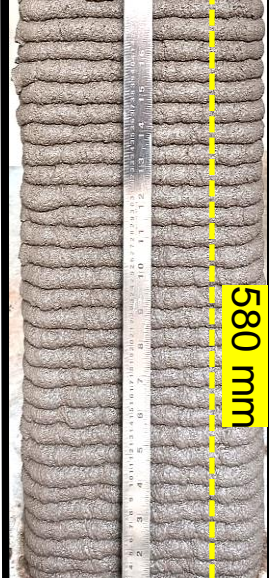
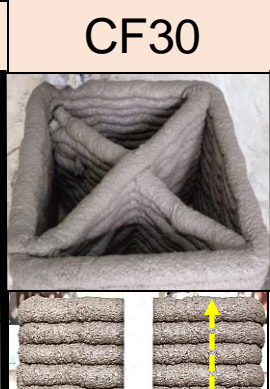
34 layers



35 layers



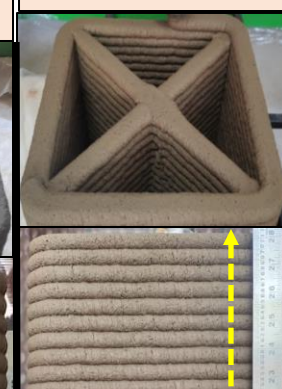
37 layers



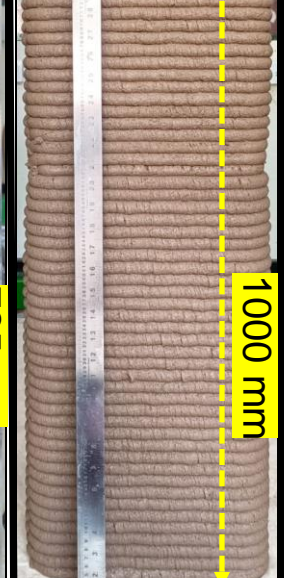
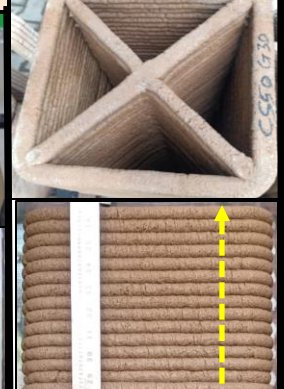
34 layers



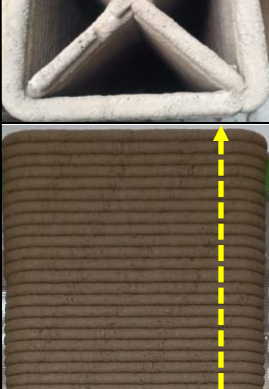
40 layers



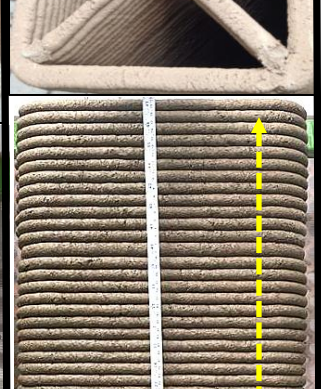
49 layers



67 layers



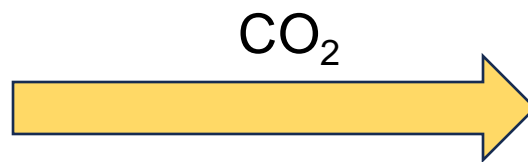
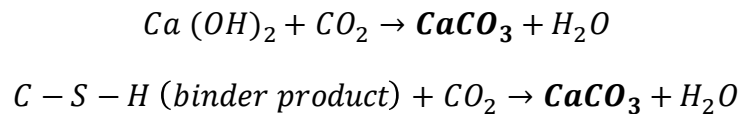
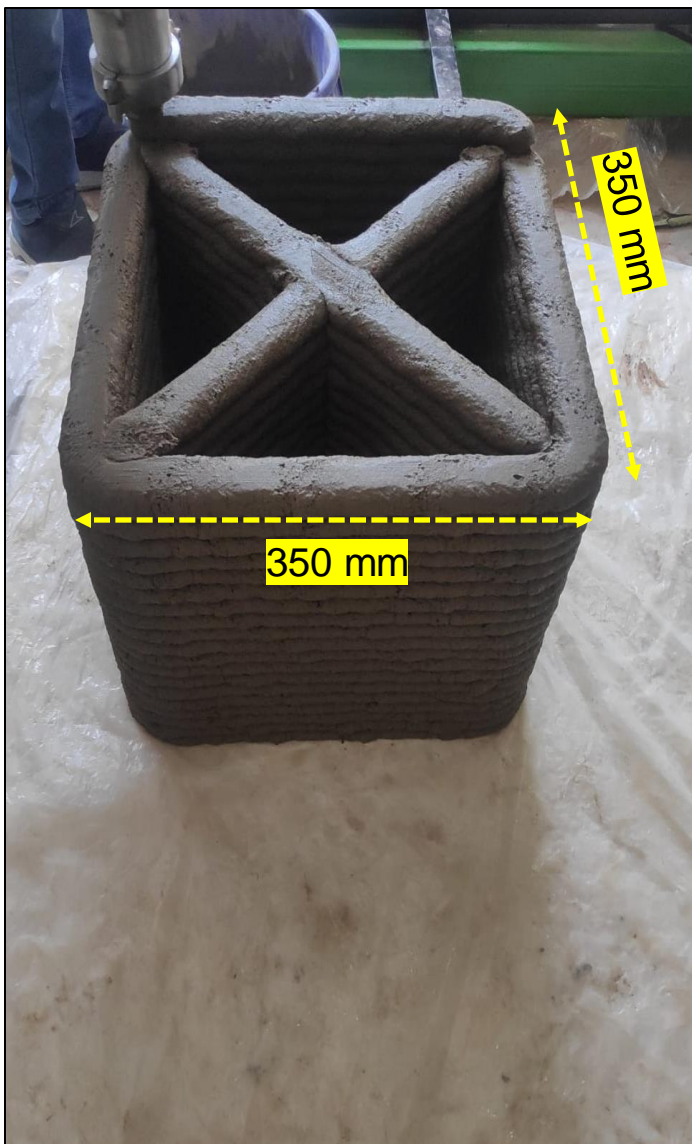
80 layers



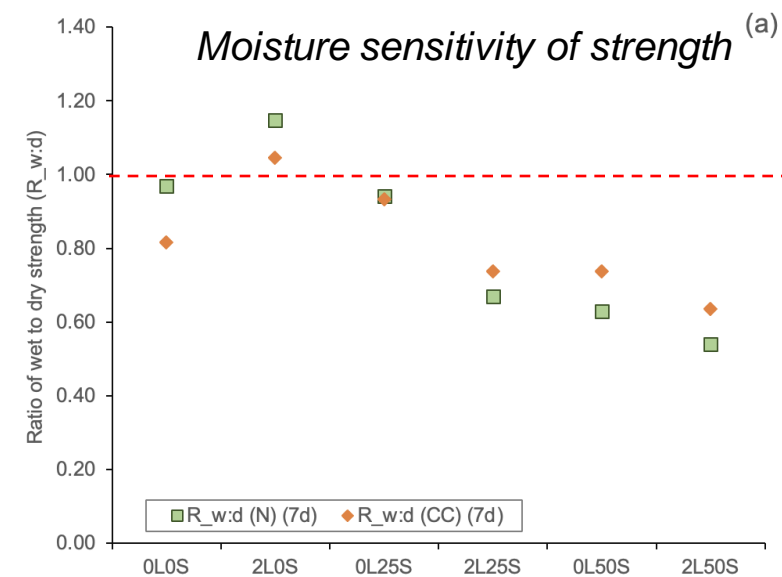
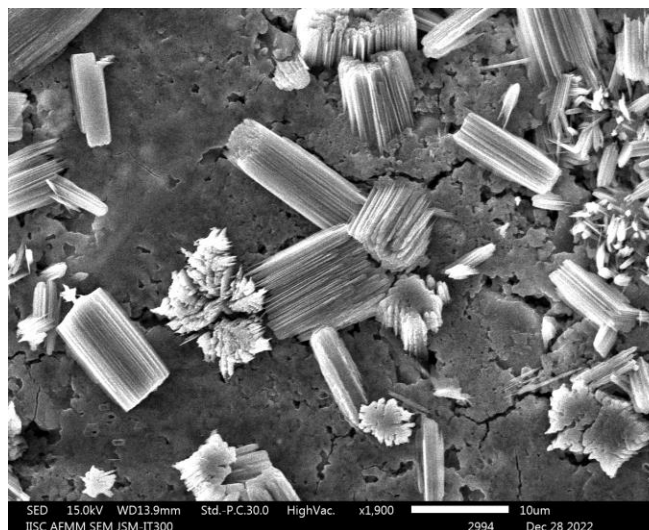
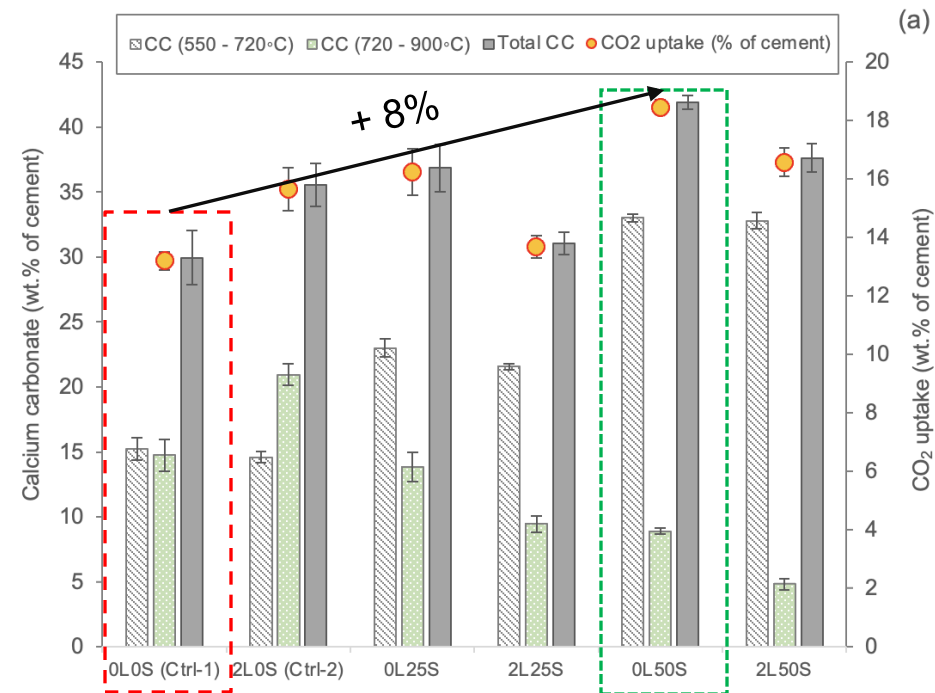
80 layers



# Carbon Sequestration in Printed Materials



Accelerated carbonation curing at variable durations





# *Thank you !*

**3D printed signage at Centre for Sustainable Technologies (CST), IISc**

