

Orange Peel Waste (OPW) 3D Printing Material

Problem: Millions of tonnes of OPW are discarded annually, leading to environmental challenges.

Solution: Upcycling OPW into **nutritious snacks** using 3D printing offers a sustainable solution for reducing food waste.

Technology: Direct Ink Writing (DIW) 3D printing was employed to create edible, nutritious snacks from OPW. The process converts OPW into a printable ink, which is used to form unique, nutrient-rich food structures.

Health Benefits: OPW contains bioflavonoids like hesperidin and narirutin, which offer antioxidant properties.

Challenges: The formulation of a stable, printable ink from OPW is a technical challenge, requiring careful balancing of consistency and nutritional content.

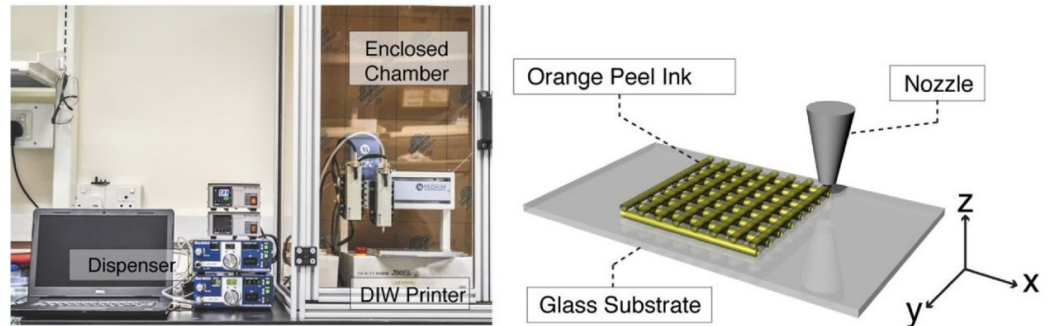
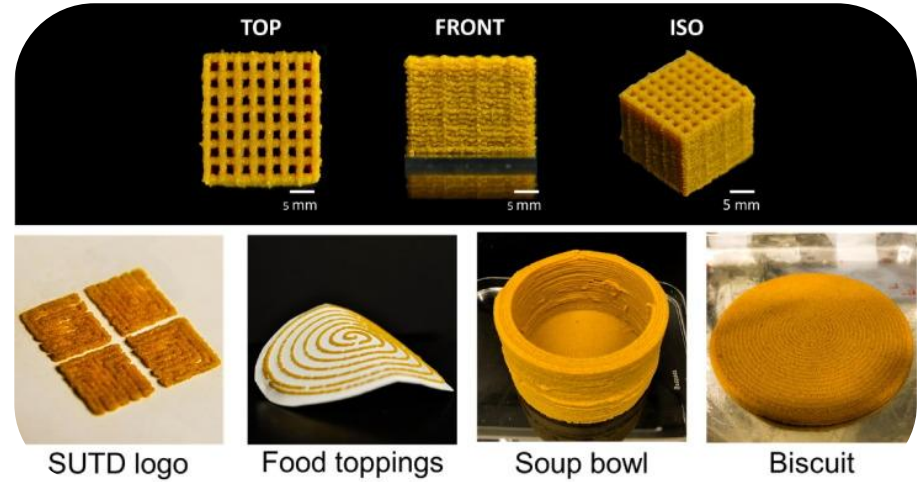


Fig. 1. Direct ink writing (DIW) 3D printing of OPW at room temperature. DIW 3D printer used in the current experiment, equipped with a robotic controller of syringes with pneumatic dispensers (left) and schematic illustration of the DIW Process (right).