NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

METHOD OF EMBEDDING CARBON NANOMATERIAL ONTO POLYMERIC POWDERS FOR ADDITIVE MANUFACTURING

TechnologyOverview

A method is proposed to produce carbon nanomaterial-reinforced polymeric composites in a powder form, which are applicable in powder-based AM techniques. The formulations and compositions of composite powders are tunable and controllable during manufacturing. This method is first to embed carbon nanomaterials into/onto the polymeric powders, and these powders are used for AM techniques, such as laser sintering or powder extrusion. These thermoplastic composite powders are melted and consolidated layer-by-layer to form 3D objects with the desired functionalities and geometries. The thermal and electrical conductance of composites can be adjusted by varying the loading percentage of conductive fillers and the types of surface functionalization.

Potential applications

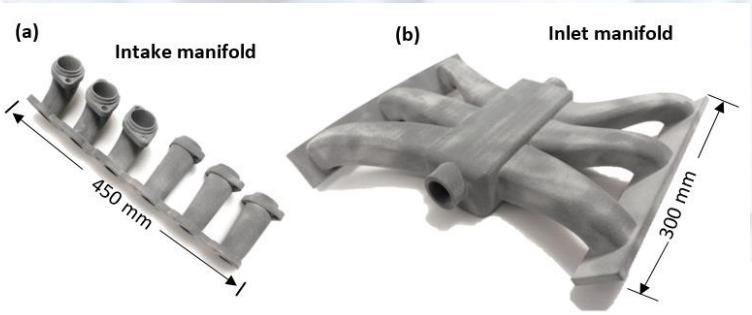
Nanocomposite powders are applicable in selective laser sintering and powder injection molding. The fabricated composite parts are light-weight and strong composites for aerospace, automobile, and anti-electromagnetic interference applications. The actual parts with complex geometries, such as turbine air ducts for aircraft, the control panel, inlet manifold and intake manifold flange for automobile, could be fabricated through selective laser sintering. The carbon nanofiller-reinforced flexible polymers with sufficient electrical and thermal conductivities, stretchability and durability in 3D architectures are useful in the new-generation actuation, packaging and soft-robotics design and manufacturing.

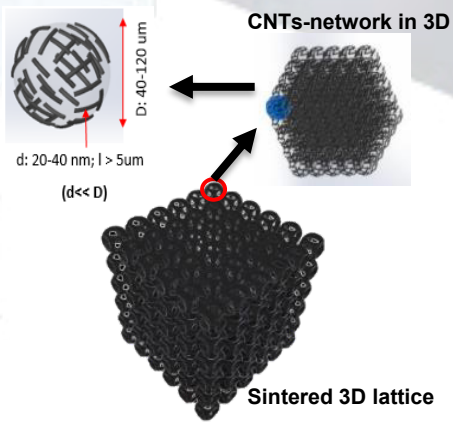
Customer Benefits

- Variability of candidate materials
- Controllable formulations, microstructures, and morphology
- Cost-effective and massive production
- Improvements in the applications of powder-based AM

Features and specifications

The laser-sintered nanocomposite possesses improved mechanical toughness and strength. These composite parts are also electrical anti-static materials (10^{-6} to 10^{-4} S/cm) and possess relatively high thermal conductivity (>4 W/Km).





If you are interested in this technology, please contact the BD Manager: edmund.lim@ntu.edu.sg

Singapore Centre for 3D Printing