

Exploring the Application of Additive Manufacturing in the Production of Aerogels for the Purpose of Creating Environmentally Friendly Agricultural Formulations with Controlled Release Properties

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Abstract : This study examines the use of additive manufacturing (AM) to develop sustainable and intelligent agricultural formulations that can gradually release fertilisers. AM offers the ability to design customised formulations with precise geometries and controlled release properties while taking into account their mechanical, chemical, and environmental properties. The study specifically investigates the use of an aerogel matrix mixed with a potential fertiliser in agriculture. Highly porous 3D printed aerogel structures were designed to enable the slow release of fertilisers. The performance of the formulated mixture is evaluated against other commonly used materials for slow-release applications. The findings suggest that the 3D printed gel made has great potential for slow-release fertilisers, providing an environmentally friendly solution for agricultural practices. The combination of AM technology and sustainable materials can play a vital role in mitigating the negative environmental impact of traditional fertilisers, as well as improving the efficiency and sustainability of agricultural production.

Keywords : 3D printing, hydrogel, aerogel, fertiliser, agriculture

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