

Special Issue

Sustainable 3D/4D Printing Systems, Materials, and Applications

Message from the Guest Editors

One of the extraordinary advances in technologies and applications concerning additive manufacturing (AM) that has been reported so far is four-dimensional (4D) printing, in which three-dimensional (3D) printing technology is combined with smart materials (SMs) to produce structures that change shape over time in response to external stimuli such as temperature, electricity, humidity, solvents, pH, or light. In other words, time could be considered as the 4th printing dimension where the developed 3D system can self-morph, self-transform, self-regenerate, adapt, evolve, or respond. 4D printing is expected to play a crucial role in future designs due to its obvious advantage of creating engineered and natural systems that are socially, environmentally, and economically sustainable. For instance, 4D printing may allow scientists to develop micro/nano-actuators, sensors, microfluidics, energy harvesters, smart solar panels and wind turbines, and energy conversion devices that efficiently reuse thermoplastic materials, aid in waste management efforts, and reduce energy consumption towards greater sustainability.

Guest Editors

Dr. Ali Zolfagharian

School of Engineering, Deakin University, Geelong, VIC 3216, Australia

Dr. Mahdi Bodaghi

Department of Engineering, School of Science and Technology,
Nottingham Trent University, Nottingham NG11 8NS, UK

Deadline for manuscript submissions

closed (31 December 2023)



Sustainability

an Open Access Journal
by MDPI

Impact Factor 3.3
CiteScore 7.7



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Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
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Editor-in-Chief

Prof. Dr. Steve W. Lyon

School of Environment and Natural Resources, Ohio State University,
Columbus, OH 43210, USA

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