

# Smart structures: From 3D to 4D printing

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## Abstract

With progressive advancements in various cutting-edge technologies, smart structures with both robust stability and manipulatable functions are highly pursued to meet the critical requirements in the various complicated environments. On the other hand, development of additive manufacturing technology has fundamentally exhibited great advantages, which provides an exclusive platform for manufacturing smart structures. Based on 3D printing added with additional dimension, either time or space, for manipulating shape, property or functions, in the present talk, I would initially analyze the key scientific issues in 4D printing technology, including design, materials, apparatus, software, manipulation and applications. Based on an advanced structure strategy for achieving smartness, I would give several examples based on our current studies for better understanding how 4D printing play a significant role in designing and manufacturing smart structures and smart devices based on the uniqueness of various materials. The 4D printing technology is expected to open up a novel strategy for substantially endowing the advanced structures with smartness and exceptionality.

**Keywords:** Simulation; 4D printing; Smart structures; Addictive manufacturing.