**Laser micro/nano 4D printing of hydrogel-based actuators**

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3D functional devices that can realize high precision, high controllability, high response speed, and reversible transformation under external stimulations will gradually become common requirements across various fields. At present, the manufacturing methods based on stimuli-responsive materials still have many limitations, including large molding size, poor controllability, slow response speed, and low design and processing freedoms, which seriously constrain the development of intelligent devices with higher functionality and higher integration in the future. In this work, we will introduce a femtosecond laser micro-nano 4D printing technology based on composite hydrogel materials. By introducing carbon nanotubes with excellent photothermal and mechanical properties and programmable 3D assembly strategies with different unit structures, we can achieve direct laser printing of programmable photon-triggerable micro-actuators with high responsiveness, high precision and high actuation speed, which lays a foundation for the future nanomanufacturing of intelligent photon-responsive devices such as photon-triggerable micro-pliers, programmable dynamic metamaterials, and micro-nano robots.



**Short Bio:**

**Wei Xiong** is currently a professor of Wuhan National Laboratory for Optoelectronics (WNLO) of Huazhong University of Science and Technology. He now serves as the executive director of the research division of Laser Science and Technology of WNLO. His research scope is mainly focused on the ultrafast laser-induced synthesis, assembly and 3D structuring of nanomaterials to solve the challenging problems which are difficult to overcome by traditional micro/nano processing technologies. He has recently published more than 100 papers in leading professional journals such as Science Advances, Nature Communications, and Advanced Materials, and holds more than 30 authorized invention patents in China and the US. He received Second Prize of the National Science and Technology Progress Award and Second Prize of the National Teaching Achievement Award in 2023