

医工薬理融合 GPLLI Seminar Series

Graduate Program for Leaders in Life Innovation

The University of Tokyo

Current Technological Advances in 3D Bioceramics Printing

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日時: 平成28年8月1日(月)、16:00~18:00

会場: 東京大学工学部 12号館 122B セミナー室



3D printing, also called additive manufacturing, is a fabrication process that uses digital information from a computer-aided design file to stack 2D layers of various materials (e.g., polymers, metals, ceramics, and composites) to produce a 3D object, without requiring any part-specific tooling. 3D printing technology offers significant advantages in the medical industry as it permits the on-demand manufacture of low-volume or one-of-a-kind parts based on patient-specific needs. 3D printing in the medical industry, both actual and potential, can be organized into several broad categories, including tissue and organ fabrication, customized prosthetics, implants, anatomical models, and pharmaceuticals.

3D printing techniques are viewed as ideal for the fabrication of 3D porous bone scaffolds with customized shapes and for the control of pore morphologies and porosity. Synthetic materials that are clinically favored for bone tissue regeneration are mainly those based on bioceramics due to the chemical similarity of bioceramics to the mineral phase of bone. Nevertheless, the development of 3D ceramics printing has been very slow when compared with other materials, due largely to the difficulty and complexity of the fabrication process, i.e. ceramics generally require both debinding and sintering steps after printing, which can lead to deformation and unstable mechanical properties of the printed 3D structure. However, successful cases for commercialization have been reported recently, and several new technologies now appear to overcome the limitations of 3D ceramics printing. Our group has recently introduced a new fabrication process for ceramic-based scaffolds that omits the debinding and the sintering processes, and we have confirmed its effectiveness for preparing scaffolds with high biofunctionality and good performance. This novel process could be adapted for the preparation of different types of ceramic-based scaffolds as multifunctional biomaterials for promotion of bone tissue regeneration. Current technological advances in 3D bioceramics printing, including our recent results, will be discussed at the conference.

Organizer: Graduate Program for Leaders in Life Innovation, The University of Tokyo

Cooperation: International Core Research Center for NanoBio

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