Non-Linear Lithography: Principles, Materials and Applications

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NonLinear Lithography is a technique that allows the fabrication of three-dimensional structures with sub-100 nm resolution. It is based on multi-photon absorption; when the beam of an ultra-fast laser is tightly focused into the volume of a transparent, photosensitive material, polymerization can be initiated by non-linear absorption within the focal volume. By moving the laser focus three-dimensionally through the material, 3D structures can be fabricated. The technique has been implemented with a variety of materials and several components and devices have been fabricated such as photonic crystals (Fig. 1a), biomedical devices (Fig. 1b), and microscopic models (Fig. 1c).
The unique capability of NonLinear Lithography lies in that it allows the fabrication of computer-designed, fully functional 3D devices. In this seminar we summarize the principles of microfabrication, and present our recent work in materials processing and functionalization of 3D structures. Finally, we discuss the future applications and prospects for the technology.

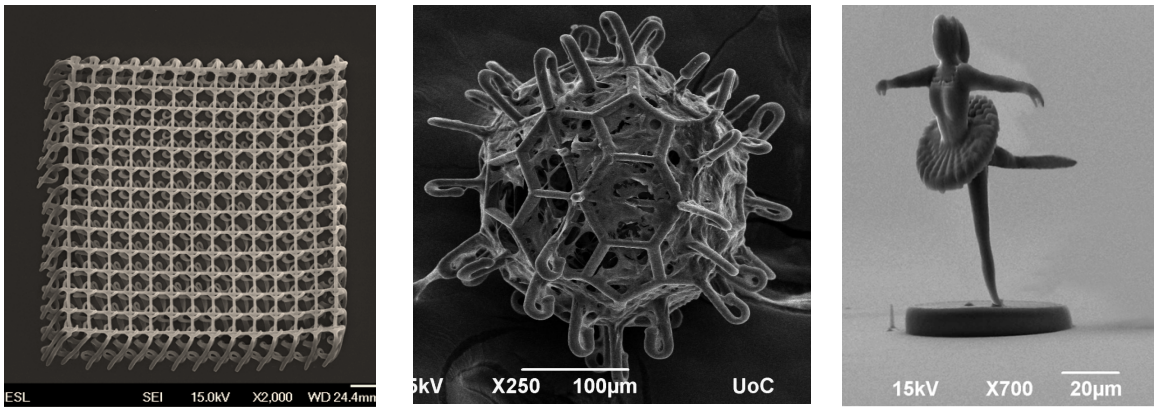

Fig. 1: (a) A spiral photonic crystal. (b) Scaffold for cell growth (c) A micro-dancer