Fluorescent Proteinaceous Microstructures Made by Femtosecond Laser Direct Writing

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We report fabrication of microstructures made of protein by femtosecond (fs) laser direct writing (LDW) that exhibit fluorescence. Although fs laser multi-photon cross-linking has been recently applied to fabricate microstructures of proteins, only limited types of proteins have been demonstrated for fabrication [1]. Our recent contributions include the fabrication of fluorescent proteins emitting different colors such green [2], or blue, green and red [3]. In all cases, for optimal fabrication conditions, original fluorescence is retained which is a desirable, while for the other conditions, fluorescence property changes. Since fluorescence is a common tool to label or track cells for many biomedical applications, fluorescent proteinaceous microstructures might render a useful addition to those biomedical applications.

In this presentation, we present our latest results with regards to the fluorescence from proteinaceous microstructures fabricated by fs-LDW. The findings do not only regard fluorescent proteins, but also, as shown in Fig. 1, the fluorescence from microstructured bovine serum albumin (BSA) that is not considered to be originally fluorescent. Understanding and controlling the fluorescence property of microstructures are desirable because fluorescence is influential in many applications.

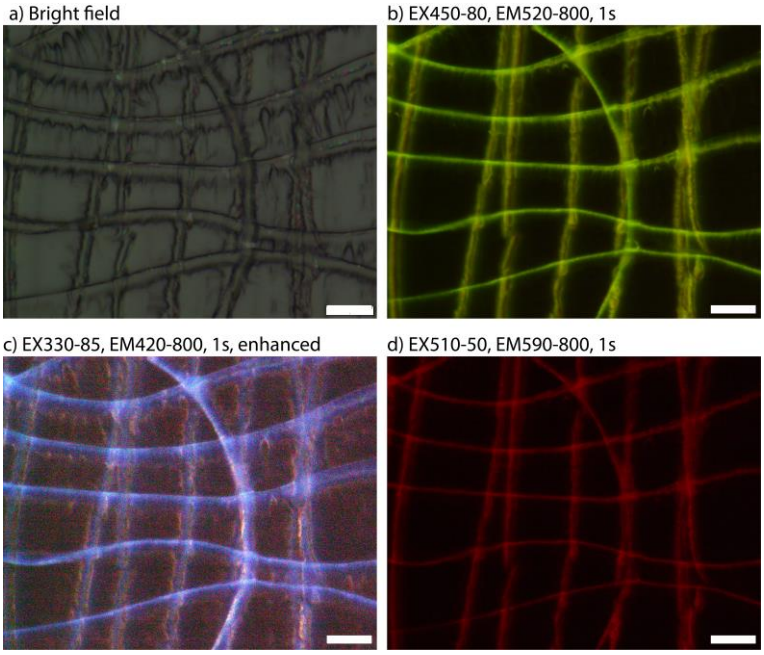

Figure 1 Fluorescent BSA mesh
With appropriate filter sets in an optical microscope Olympus BX51, we observe different colors of fluorescence from dried BSA microstructures. In contrast to fluorescent proteins, long signal acquisition is needed. Scale bar represents 10 μm.

References
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[3] D. Serien, M. Abe, M. Terakawa, H. Kawano, A. Miyawaki, K. Midorikawa, and Koji Sugioka, in preparation