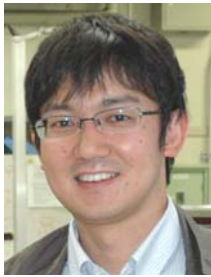


Nano-Bioinjection into *C. elegans*



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Abstract

We have constructed the bionanomanipulation system inside a hybrid microscope which consists with an Environmental Scanning Electron Microscope (E-SEM) and an Optical Microscope (OM) [1]. This system enable to manipulate a biological sample with water-containing condition and internal imaging including fluorescent information. We applied this system to the nanoinjection system to analyze the condition of *Caenorhabditis elegans* (*C. elegans*) [2]. The *C. elegans* is one of the smallest animal used as a model organism. The nanoinjection tools were prepared for injecting micro-nano gel beads fabricated by focused ion beam (FIB) process as shown in Fig. 1.

To realize effective nanomanipulation, a novel Nanotool Exchanger System (NTEsS) was proposed for exchanging different nanotools within the sample chamber [3]. To maintain the livable condition of biological samples, it is important to reduce the exchange time of the nanotools. This is also important to improve the efficiency of biological specimen analysis using various nanotools without break the chamber pressure.

Biography

Masahiro Nakajima graduated from Shizuoka University in 2001, and received the Dr. Eng. degree from Nagoya University in 2006. He had been a Research Fellow of MEXT from April to May in 2006, a Research Associate from June 2006 to March 2007, and an Assistant Professor from April 2007 to September 2009 at the Dept. of Micro-Nano Systems Engineering, Nagoya University. Currently, he is an Assistant Professor at the Center for Micro-nano Mechatronics, Nagoya University, from October 2009. He has received awards including the IEEE Nanotechnology Early Career Award (2013), Best Paper Award in MHS 2012 (2012), Best Manipulation Paper Award at ICRA 2011(2011), Incentive Award of SICE Chubu (2008), and Incentive Award of JSME Tokai (2007). He has interests in the research fields of the applications of micro/nano-manipulation, nano-assembly, nano-fabrication, nano-devices, nano-mechanics, and nano-biology.

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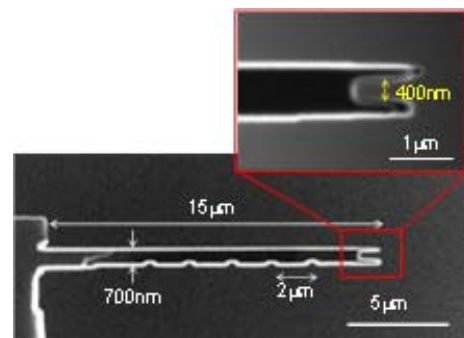


Fig. 1 Nanoinjection tool to attach micro-nano gel beads.

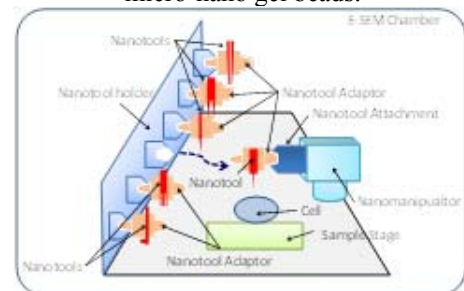


Fig. 2 Nanotool Exchanger System (NTEsS) for effective nanomanipulation