CAMT Seminar

"FUNCTIONAL STUDY OF CARBON NANOTUBES AS ADHESIVES FOR MICRO-OBJECTS"

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Abstract

Micro and nanomanipulation in high vacuum requires non-volatile adhesives or gas-free procedures to fix the object to various carriers and manipulators. Examples of such needs can be found in electron microscopy that uses dual beam systems, focused ion beam – scanning electron microscopy (FIB-SEM), for the preparation of lamellas used in transmission electron microscopy (TEM). In the currently used process, a gas assisted welding with gas injection system (GIS) is required when attaching a sample chunk to a micro-manipulator (e.g. EasyLift), as well as when mounting the chunk onto a half-moon TEM grid. Optimally, the GIS welding steps should be avoided. The gecko's adhesive ability motivated the two-steps welding-free procedure for lift out utilizing the forest of carbon nanotubes (CNTs) on the surface. In our experiments, the CNTs forest was grown by a typical catalytic chemical vapor deposition (CCVD) method using Oxford Instruments Nanofab. However, the procedure requires better understanding of the growth of dense and vertically aligned CNTs on different types of materials, especially without using thick dielectric barrier layers often utilized to avoid dissolution of catalysts into the supporting metal substrates. Therefore, one of the key points studied in this paper was the growth CNTs on different materials and microscopic objects used as carriers or manipulators. The functionality of CNTs-covered carriers and manipulators was tested directly in dual beam systems. The adhesive force of CNTs forests of different density and height was evaluated using atomic force microscopy.

(Host: Satoshi Hamaguchi Ext：7913)