분과초청1

A New Approach to Surface Imaging by Nano Secondary Ion Mass Spectrometry

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Many of the complex materials developed today derive their unique properties from the presence of multiple phases or from local variations in elemental concentration. Simply performing analysis of the bulk materials is not sufficient to achieve a true understanding of their physical and chemical natures.

Secondary ion mass spectrometer (SIMS) has met with a great deal of success in material characterization. The basis of SIMS is the use of a focused ion beam to erode sample atoms from the selected region. The atoms undergo a charge exchange with their local environment, resulting in their conversion to positive and negative secondary ions. The mass spectrometric analysis of these secondary ions is a robust method capable of identifying elemental distribution from hydrogen to uranium with detectability of the parts per million (ppm) or parts per billion (ppb) in atomic range.

Nano secondary ion mass spectrometer (Nano SIMS, Cameca Nano-SIMS 50) equipped with the reactive ion such as a cesium gun and duoplasmatron gun has a spatial resolution of 50 nm which is much smaller than other SIMS. Therefore, Nano SIMS is a very valuable tool to map the spatial distribution of elements on the surface of various materials

In this talk, the surface imaging applications of Nano SIMS in KBSI will be presented.

Keywords: Surface Imaging, Nano SIMS, Elemental Distribution

분과초청2

Rational Design and Facile Fabrication of Tunable Nanostructures towards Biomedical Applications

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For the rational design and facile fabrication of novel nanostructures, we present a new approach to generating arrays of three-dimensionally tunable nanostructures by exploiting light-matter interaction. To create controlled three-dimensional (3D) nanostructures, we utilize the 3D spatial distribution of light, induced by the light-matter interaction, within the matter to be patterned. As a systematic approach, we establish 3D modeling that integrates the physical and chemical effects of the photolithographic process. Based on a comprehensive analysis of structural formation process and nanoscale features through this modeling, we are able to realize three-dimensionally tunable nanostructures using facile photolithographic process. Here we first demonstrate the arrays of three-dimensionally controlled, stacked nanostructures with nanoscale, tunable layers. We expect that the promising strategy would open new opportunities to produce the arrays of tunable 3D nanostructures using more accessible and facile fabrication process for various biomedical applications ranging from biosensors to drug delivery devices.

Keywords: nanostructure, nanofabrication, light-matter interaction, photolithography