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Ar-GCIB를 이용하여 ToF-SIMS에서 얻은 쥐의 뇌조직 이미지

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나노바이오연구분야에서 ToF-SIMS를 이용하여 lipid와 metabolite같은 저 분자의 생체물질을 측정하는데 널리 이용되어 왔다. 최근에는 고 분자량의 생체물질을 측정하기 위해서 C60, water cluster, argon cluster등의 다양한 종류의 클러스터 이온빔들이 개발되어 왔다. [1,2] 하지만 tissue샘플을 클러스터 이온빔을 이용하여 분석한 결과에서도 m/z 1500이상의 고분자를 측정한 결과는 거의 없다. 바이오샘플의 charging을 상쇄하기위해 low energy electron beam (~20 eV)을 사용하는데, low energy electron beam이 샘플에 damage를 주기 때문이다. [3] 본 연구에서는 electron fluence (electrons/cm2)가 증가함에 따라 PC(16:0/18:1(9Z)와 Ganglioside GM1의 intensity가 감소함을 알았고, low energy electron beam에 의해 생체물질이 damage를 받을 수 있음을 확인하였다. 따라서 tissue 샘플을 SUS기판에 샘플링하고Ar-GCIB를 이용하면 charging없이tissue imaging을 성공적으로 수행할 수 있고, m/z 2000이상의 고 분자량의 생체물질을 측정할 수 있음을 확인하였다.

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Amine functionalized plasma polymerized PEG film: Elimination of non-specific binding for biosensing

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Biosensors currently suffer from severe non-specific adsorption of proteins, which causes false positive errors in detection through overestimation of the affinity value. Overcoming this technical issue motivates our research. Polyethylene glycol (PEG) is well known for its ability to reduce the adsorption of biomolecules; hence, it is widely used in various areas of medicine and other biological fields. Likewise, amine functionalized surfaces are widely used for biochemical analysis, drug delivery, medical diagnostics and high throughput screening such as biochips. As a result, many coating techniques have been introduced, one of which is plasma polymerization – a powerful coating method due to its uniformity, homogeneity, mechanical and chemical stability, and excellent adhesion to any substrate. In our previous works, we successfully fabricated plasma-polymerized PEG (PP-PEG) films [1] and amine functionalized films [2] using the plasma enhanced chemical vapor deposition (PECVD) technique. In this research, an amine functionalized PP-PEG film was fabricated by using the plasma co-polymerization technique with PEG 200 and ethylenediamine (EDA) as co-precursors. A biocompatible amine functionalized film was surface characterized by X-ray photoelectron spectroscopy (XPS) and Fourier-transform infrared spectroscopy (FT-IR). The density of the surface amine functional groups was carried out by quantitative analysis using UV-visible spectroscopy. We found through surface plasmon resonance (SPR) analysis that non-specific protein adsorption was drastically reduced on amine functionalized PP-PEG films. Our functionalized PP-PEG films show considerable potential for biotechnological applications such as biosensors.

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