How to Measure and Image Large Biomolecules by Using Ar-GCIB and Bi-Cluster ToF-SIMS: Delayed Extraction, External Calibrants and Enzyme-Amplified Signal Enhancement

Tae Geol Lee[1,2*], Hyun Kyong Shon[1], Hee-Kyung Na[1], Minh-Uyen Thi Le[1,2], Jin Gyeong Son[1], Jeong Hee Moon[3]

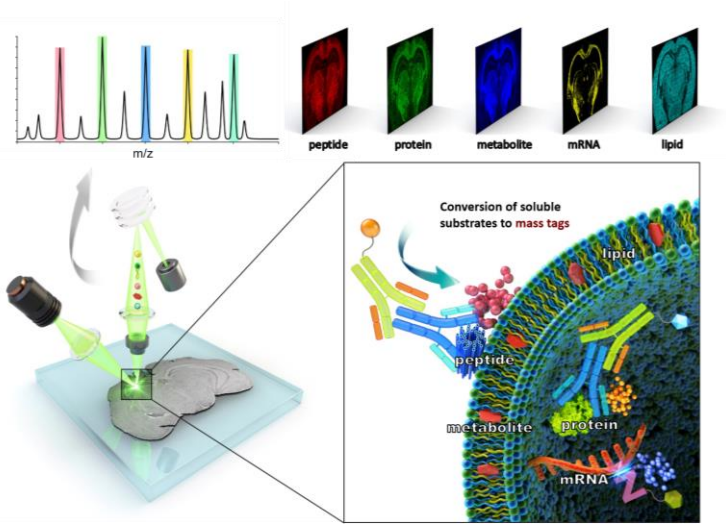
(1) *Center for Nano-Bio Measurement, Korea Research Institute of Standards and Science (KRISS), Daejeon 34113, Korea*

(2) *Department of Nano Science, University of Science and Technology (UST), Daejeon 34113, Korea*

(3) *Disease Target Structure Research Center, Korea Research Institute of Bioscience and Biotechnology (KRIBB), Daejeon 34141, Korea*

Time-of-flight secondary ion mass spectrometry (ToF-SIMS) is a powerful tool due to its sensitivity, chemical specificity, and high spatial resolution in visualizing chemical information in cells and tissues. However, the sensitive and specific imaging of large molecules such as peptides, proteins, and mRNA, a task that has been, to date, are still challenging.

Here, we will show our strategies to measure and image large biomolecules by using Ar-gas cluster ion beam (GCIB) together with delayed extraction and external calibration [1,2], and by using Bi-cluster ion beam together with enzyme-amplified signal enhancement [3,4].



[1] H.K. Shon *et al*., *Biointerphases*, **11**, 2016, 02A321.

[2] J.G. Son *et al*., *Biointerphases*, **15**, 2020, 021011.

[3] H.-K. Na *et al*., *Sensors and Actuators: B. Chemical*, **332**, 2021, 129452.

[4] M.-U. Thi Le *et al*., *Analytical Chemistry*, under revision.