

## Ambient Mass Spectrometry Imaging of Lipid Molecules from Live Cells and Tissues Using Nanomaterials

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We have been developing new methods to analyze cells and tissues in ambient condition without any harsh chemical fixation or physical freezing and drying for last several years. The first approach, an atmospheric pressure mass spectrometry imaging method, is based on laser ablation in atmospheric pressure assisted by atmospheric plasma and nanomaterials such as nanoparticles and graphene to enhance laser ablation. The second one is based on secondary ion mass spectrometry (SIMS) imaging of live cells in solution capped with single layer graphene to preserve intact and hydrated biological samples even under ultrahigh vacuum for SIMS bio-imaging in solution.

Recent activities such as the extension of the molecular analysis range from lipids to proteins, applications to neuronal and cancer cell using, confocal, SIMS, and SEM/HIM will be discussed.

### References:

- [1] JY Kim et al., *Nat. Comm.* **8** (2017), p. 2113.
- [2] H Lim et al., *Nature Methods* **18** (2021), p. 316.