

# Quantitative Mass Spectrometric Analysis of Mixed Self-Assembled Monolayers for Biochips

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Formation and characterization of self-assembled monolayers (SAMs) on various surfaces are the essential basis for many other applications, including molecular switches, biosensors, microfluidics, and fundamental studies in surfaces and interfaces. To improve the performance at these applications, it is a key to control the quantity of each molecule in various mixed SAMs on the surface. In this study, using mixed SAM of carbamate-based hydroquinone (HQ)-PhBr and 11-mercaptoundecanol, the quantitative mass spectrometric method of mixed SAM was developed based on comparison study with XPS and FT-IR methods. In addition, our method was applied to another mixed SAM of biotinylated PEG alkane thiol and 11-mercaptoundecanol for verification purpose. Time-of-flight secondary mass spectrometry (ToF-SIMS) analysis was performed to identify and quantify each molecule of mixed SAM along with principal component analysis (PCA). Since there is no matrix effect in the X-ray photoelectron spectroscopy (XPS) and Fourier transform-infrared (FT-IR) techniques, we compared ToF-SIMS results with XPS and FT-IR results. Because PCA results from ToF-SIMS analysis are well matched with XPS and FT-IR results from both mixed SAMs, we are expecting that our method will be useful to identify and quantify each molecule in various mixed SAMs.

**Keywords:** Mixed Self-assembled monolayers (SAM), ToF-SIMS, XPS, FT-IR