Lecithin is a lipid that consists mostly of choline, but also includes inositol, phosphorus and linoleic acid. We herein report on the study of surface plasmon resonance (SPR) of thin gold (Au) films coated with thin layers of phospholipid material, which had been exposed to atmospheric pressure (AP) plasma containing both pure Ar and Ar mixed with O₂ (Ar/O₂, 0.8 %). The phospholipid material that we used for the SPR experiments was lecithin and the AP plasma system was applied in air by means of a radio frequency (RF) plasma generator. A thin (~60 nm) film of Au and a thin (~15 nm) layer of lecithin were deposited and attached to the face of a prism and surface plasmon modes were excited along the interfaces of the prism-Au-lecithin-air system by means of prism coupling using a He-Ne Laser (632.8 nm). It was found that the experimental SPR reflectance curves of the Au-lecithin-air modes shifted towards those of the Au-air mode with increasing applications of AP RF plasma treatment. From the shifts in the SPR curves, we found that the estimated thickness of the lecithin layer treated with pure Ar plasma showed a linear decrease with an etching rate of about 3 nm per trial of the treatment, while the thickness of the lecithin layer treated with mixed Ar/O₂ plasma showed a tendency to saturate following a large initial decrease (ca. 14 nm). All these results indicate that the use of SPR sensing could facilitate the detection of extremely small variations in plasma-treated films of biomaterial. The detailed experimental results of the SPR analysis as well as the correlation to the phospholipid layer properties will be presented.

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