Fabrication and Evaluation of Miniature Surface Plasmon Resonance Sensor Chips

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An optical polymer, namely Norland Optical adhesive 61 (NOA 61), has a high refractive index (n~1.56) and rigid. Due to its unique optical properties, NOA 61 has been used in the development of polymeric lenses using the confined sessile drop technique for sensor devices, such as surface plasmon resonance (SPR) sensor chip with Kretschmann configuration, i.e. prism-coupled surface plasmon resonance (PC-SPR). [1-2] Besides PC-SPR, grating-coupled SPR (GC-SPR) techniques has been used to another way to excite surface plasmons on the sensor surface. [3] In this work, we fabricated NOA 61 prism with grating pattern using the confine sessile drop technique and nanoimprinting technique to demonstrate a dual mode of disposable SPR sensor chip, which exhibited simultaneous excitations of PC-SPR and GC-SPR. The grating pattern on NOA 61 prism was fabricated using a polydimethylsiloxane (PDMS) substrate that traced from BD-R grating structure as a template. The liquid NOA 61 formed a hemispherical prism under gravitational force and Gibb's inequality equation on PDMS substrate to provide NOA 61 hemispherical prism. After curing, the NOA 61 prism with grating pattern was obtained. The results showed that grating pattern was created through PDMS nanoimprinting on the surface of NOA 61 prism. The grating structures were studied by AFM observations. Furthermore, the surface plasmon excitations on metal surface were observed in the broad wavelength region of visible-near infrared range.

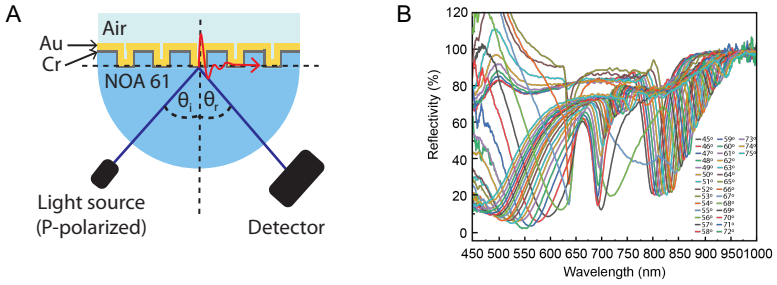

Figure 1. A) Schematic of PGC-SPR and B) SPR reflectivity curves in air (n = 1.00) of PGC-SPR.

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