

프리즘 커플러를 이용한 도파로형 Au/SiO<sub>2</sub> 나노 혼합박막의  
광 스위칭 특성 연구

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**Study of the optical switching properties  
in waveguide type Au/SiO<sub>2</sub> nanocomposite film using prism coupler**

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**Abstract** : The resonance properties due to the surface plasmon(SP) excitation of metal nanoparticles make the nanocomposite films promising for various applications such as optical switching devices. In spite of the well-known ultra-sensitive operation of optical switches based on a guided wave, the application of nanocomposite film(NC) has inherent limitation originating from the excessive optical loss related with the surface plasmon resonance(SPR). In this study, we addressed this problem and present the experimental and theoretical analysis on the pump-probe optical switching in prism-coupled Au(1 vol.%):SiO<sub>2</sub> nanocomposite waveguide film. The guided mode was successfully generated using a near infrared probe beam of 1550 nm and modulated with an external pump beam of 532 nm close to the SPR wavelength. We extend our approach to ultra-fast operation using a pulsed laser with 5 ns pulse width. To improve the switching speed through the reduction in thermal loading effect accompanied by the resonant absorption of pump beam light, we adopted a metallic film as a coupling layer instead of low-index dielectric layer between the high-index SF10 prism and NC slab waveguide. We observed great enhancement in switching speed for the case of using metallic coupling layer, and founded a distinct difference in origin of optical nonlinearities induced during switching operation using cw and ns laser.

**Key Words** : 나노혼합박막, 프리즘 커플러, 광 스위치, 도파로

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