

바이오센서용 평판형 광도파로 센서 제작 및 황색포도상구균 검출 특성

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Fabrication of Planar Type Optical Waveguide for the Application of Biosensor and Detection Characteristics of *Staphylococcus Aureus*

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Abstract : In this paper, designed and simulated Power Splitter (PS) integrated Mach-Zehnder interferometer (MZI) based planar type optical waveguide devices (which is called here a PS-MZI). The PS-MZI optical waveguide sensor was preceded by a Y-junction, which splits the input power between the sensor, and a reference branch, to minimize the effect of optical power variations. The PS-MZI optical waveguide sensor induced changing phases of the incident beam, which had fallen upon the waveguide through computer simulation, according to the small changes in the index of refraction, thus beam intensity was changed. The waveguide were optimized at a wavelength of 1550 nm and fabricated according to the design rule of 0.45 delta%, which is the difference of refractive index between the core and clad. The fabrication of PS-MZI optical waveguide sensor was performed by a conventional planar lightwave circuit (PLC) fabrication process. The PS-MZI optical waveguide that was fabricated to be applied as a biosensor revealed a low insertion loss and a low polarization-dependent loss. After having etched the over-clad at the sensor part in the MZI optical waveguide that was fabricated, Ti deposition was made on the adhesion layer, and then Au thin-film deposition was carried out thereon. In addition, its optical properties were measured by having changed the index of refraction oil at the sensing part of the MZI. To apply the planar type PS-MZI optical waveguide as a biosensor, a detection test for *Staphylococcus aureus* was conducted according to changes in concentration, having adopted Ti-alkoxide as ligand. The detection result of the *S. aureus* by the PS-MZI optical waveguide sensor was possible to the level of 10^1 CFU/ml.

Key Words : biosensor, Mach-Zehnder interferometer, optical waveguide, planar lightwave circuit, *Staphylococcus aureus*