

Measurement of Effective Refractive Index of Anodic Aluminum Oxide Using a Prism Coupler

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In recent years, Anodic aluminum oxide(AAO) has become popular and attractive materials. It can be easily fabricated and self-organized pore structures. It has been widely used as a biosensor membrane, photonic crystal for optical circuit and template for nanotube growth etc. In previous papers, the theory was developed that AAO shows anisotropic optical properties, since it has anisotropic structure with numerous cylindrical pores. It gives rise to the anisotropy of the refractive index called as birefringence. It can be used as conventional polarizing elements with high efficiency and low cost. Therefore, we would like to compare the theory and experimental results in this study. One method which can measure effective refractive index of thin film is the prism coupling technique. It can give accurate results fast and simply. Furthermore, we can also measure separately the refractive index with different polarization using polarization of the laser (TE mode and TM mode). We calculated the effective refractive index with effective medium approximations (EMAs) by pore size in the SEM image. EMAs are physical models that describe the macroscopic system as the homogeneous and typical method of all mean field theories.

