ADVANCED OPTICAL MATERIALS

Supporting Information

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Fabrication and Encapsulation of a Short-Period Wire Grid Polarizer with Improved Viewing Angle by the Angled-Evaporation Method

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Supporting Information

Measurement of the refractive index and thickness of the polymerized epoxy-SSQ

An ellipsometer (AutoEL) was used to measure the refractive index and the thickness of thin films. Silicon was used as a substrate, and epoxy-SSQ was spin-coated onto this substrate. After UV curing, the refractive index and the thickness were measured. The thickness of the coating was controlled to be 200 nm.

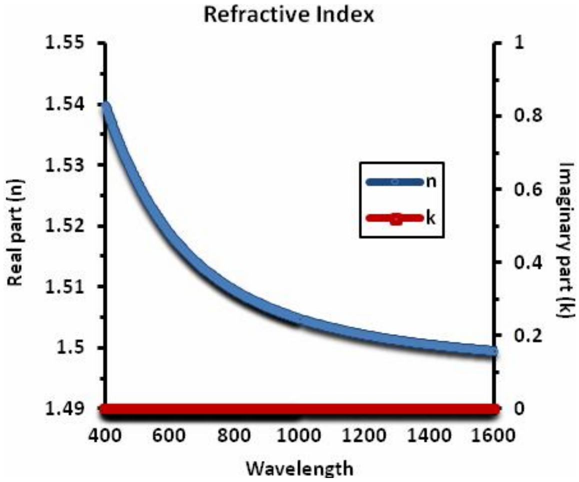

Figure 1. The refractive index of the polymerized epoxy-SSQ measured with an ellipsometer.

This refractive index data was used for angle simulation and encapsulation simulation. The refractive index of the general polymer is known to be ~1.5 in the visible wavelength range. The refractive index consists of 2 parts: *n* is a real part of the refractive index, which indicates the phase speed, while *k* is the imaginary part, which indicates the amount of absorption loss when the electromagnetic wave propagates through the material. This result shows that *k* is nearly 0 in the visible wavelength range.

Simulation results for the effect of the coating thickness on TM and TE

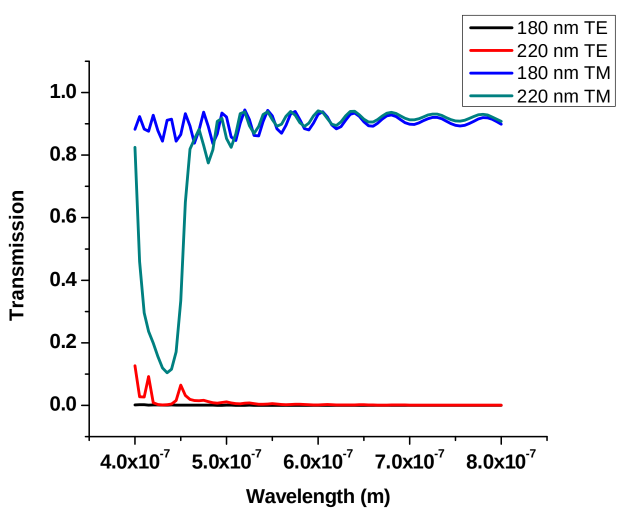

Figure 2. Simulations of TM and TE with 4 µm encapsulation of PMMA.

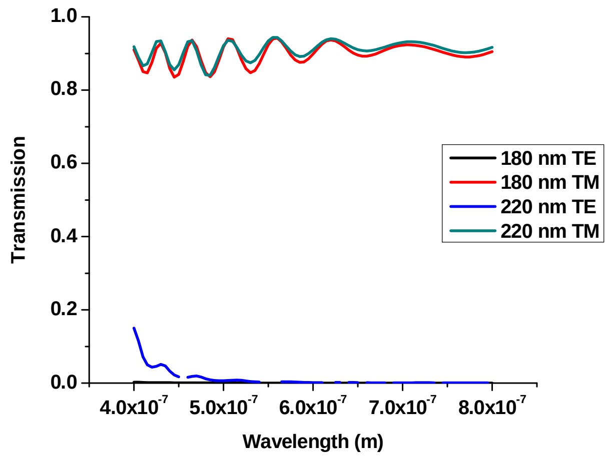

Figure 3. Simulations of TM and TE with 2 μm encapsulation of PMMA.

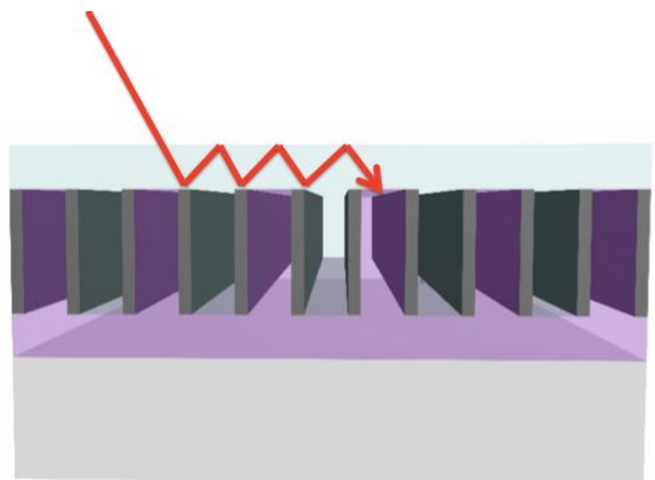

Figure 4. Fabry–Perot resonance between aluminum gratings and PMMA.

A simulation was conducted to estimate the effect of the coating thickness on TM and TE. The results are shown in Figures 2 and 3. In the case of a 4 μm coating thickness and 220 nm grating, the TM values dropped between 410 nm and 450 nm. The oscillatory behavior is shown in Figures 2 and 3. These phenomena were induced from the Fabry-Perot resonance, which is shown in Figure 4. Such resonance can be suppressed by using thinner overcoating. Therefore the encapsulation should be thin enough. Resonance effect can be observed for the 220 nm period embedded structure and cannot be used as a polarizer in the blue wavelength range. However, such effect is suppressed in the shorter period grating of 180nm.