ADVANCED MATERIALS

Supporting Information

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Strong Resonance Effect in a Lossy Medium-Based Optical Cavity for Angle Robust Spectrum Filters

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Supporting Information

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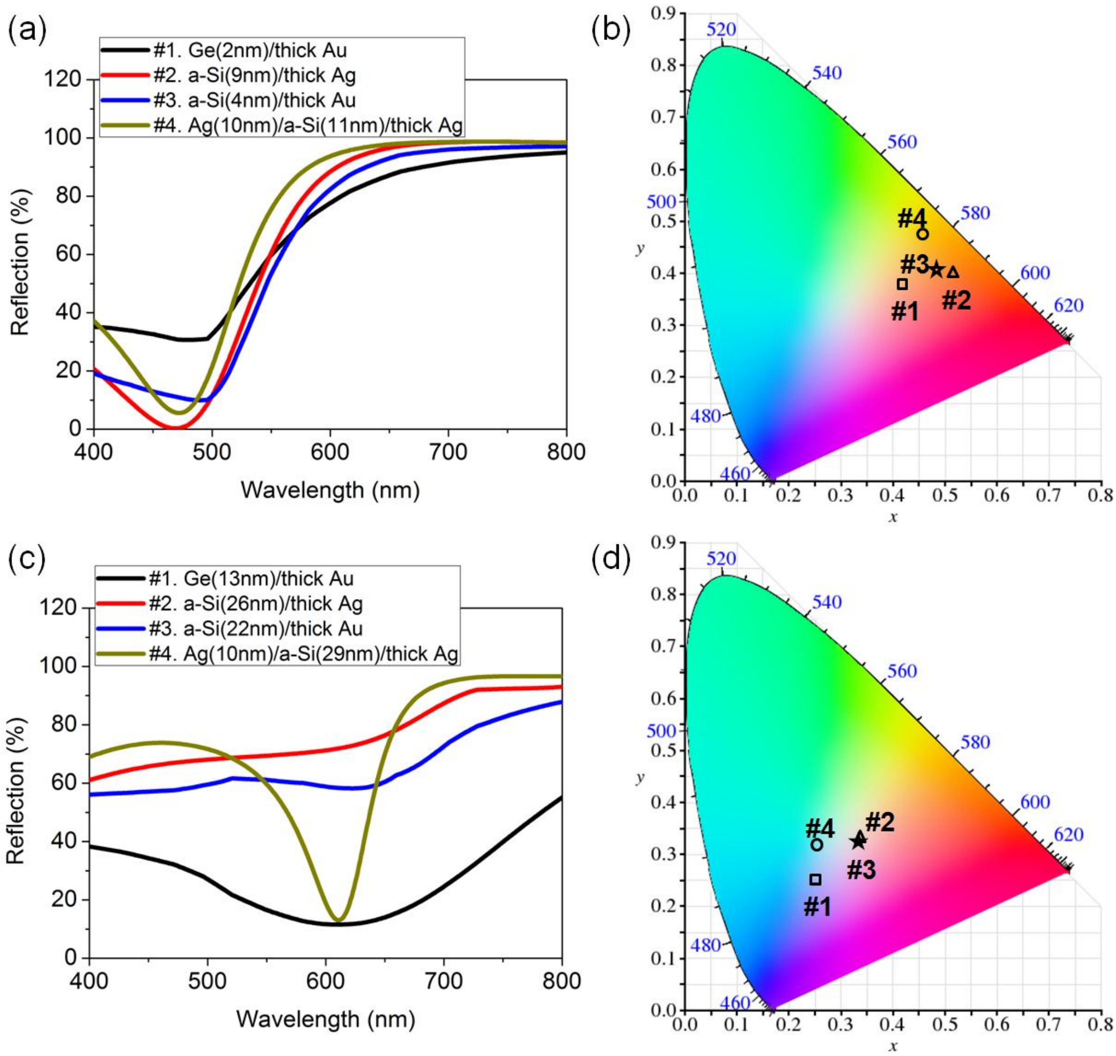

Figure S1. The calculated reflection spectra for the yellow and cyan colors in (a) and (c), and the corresponding color coordinates in (b) and (d), respectively.

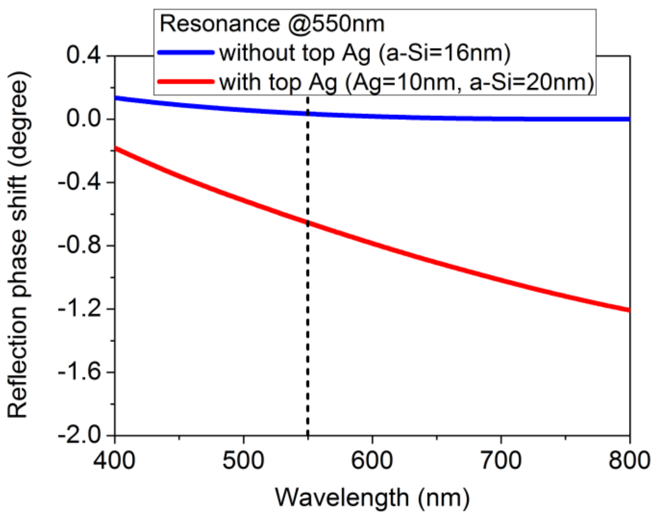

Figure S2. The calculated reflection phase shifts from the top air/a-Si interface (blue) and Ag/a-Si interface (red).

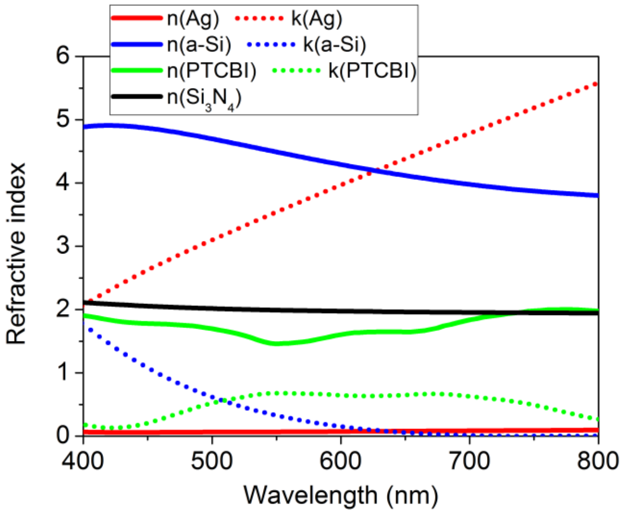

Figure S3. Refractive indices of Ag (20nm), a-Si (50nm), Si_3N_4 (100nm), and PTCBI (10nm), measured by a spectroscopic ellipsometer (M-2000, J. A. Woollam).

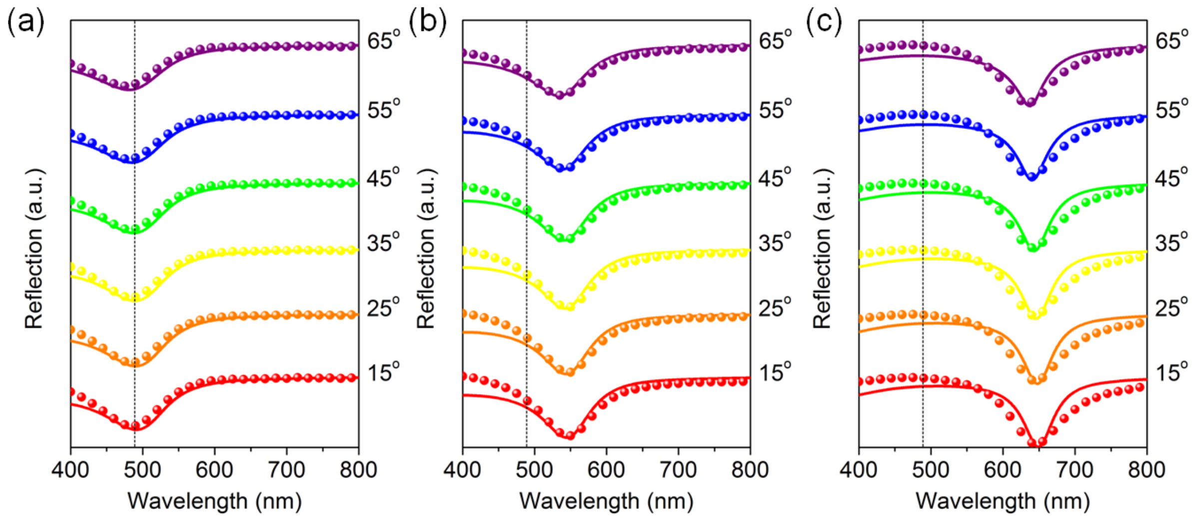

Figure S4. The simulated (solid lines) and measured (solid symbols) angle resolved reflection spectra for unpolarized light.

Geometry	Yellow	Magenta	Cyan
	FWHM (Q-factor)	FWHM (Q-factor)	FWHM (Q-factor)
Ge/Au	262nm (1.79)	259nm (2.12)	308nm (1.98)
Ag/a-Si/Ag	153nm (3.07)	102nm (5.39)	64nm (9.53)

Table I. A summary of the Q-factor of each optical cavity system.

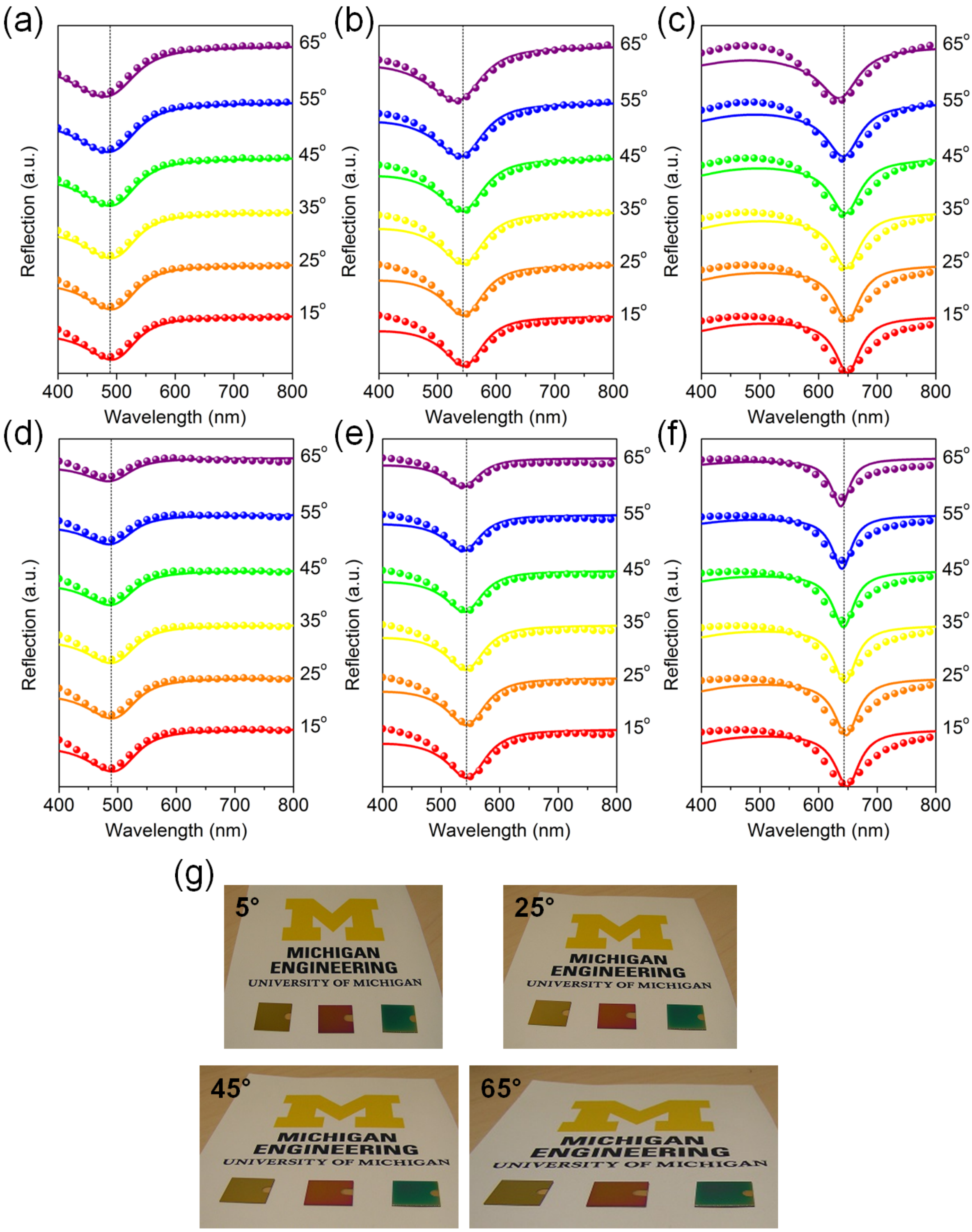

Figure S5. Measured and calculated reflection spectra at oblique angles of incidence ranging from 15° to 65° for TM ((a) – (c)) and TE polarization ((d) – (f)). (a) & (d) A resonance occurs at 485nm corresponding to yellow. (b) & (e) 545nm corresponding to magenta. (c) & (f) 645nm corresponding to cyan. (g) Optical images of the fabricated spectrum filters from 5° to 65°. It is clear that there is no color change even at large angle (65°), validating the angle robust property of our proposed device.

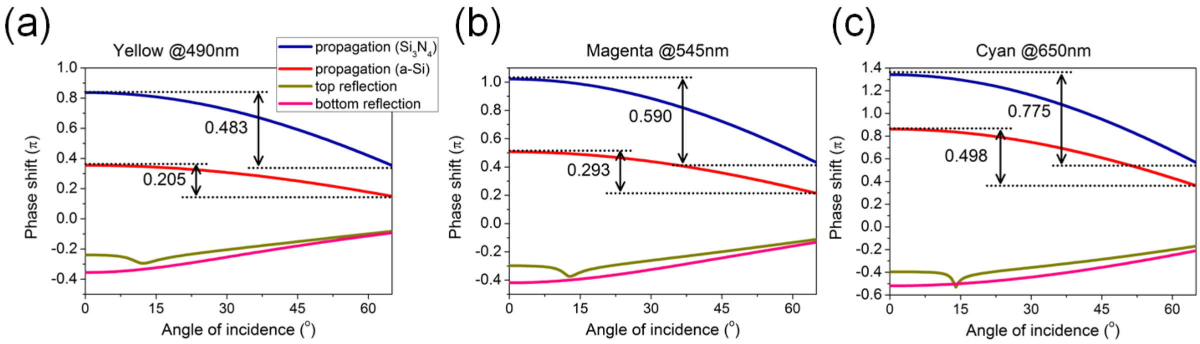

Figure S6. (a) - (c) Calculated non-trivial reflection phase shifts at both the top and bottom semiconductor and metal interfaces and the accumulated phase shift during the propagation as a function of the angle of incidence for (a) Yellow corresponding to 490nm. (b) Magenta corresponding to 545nm. (c) Cyan corresponding to 650nm. The propagation phase shift attained from an optically transparent cavity (Si_3N_4) is included as a reference.

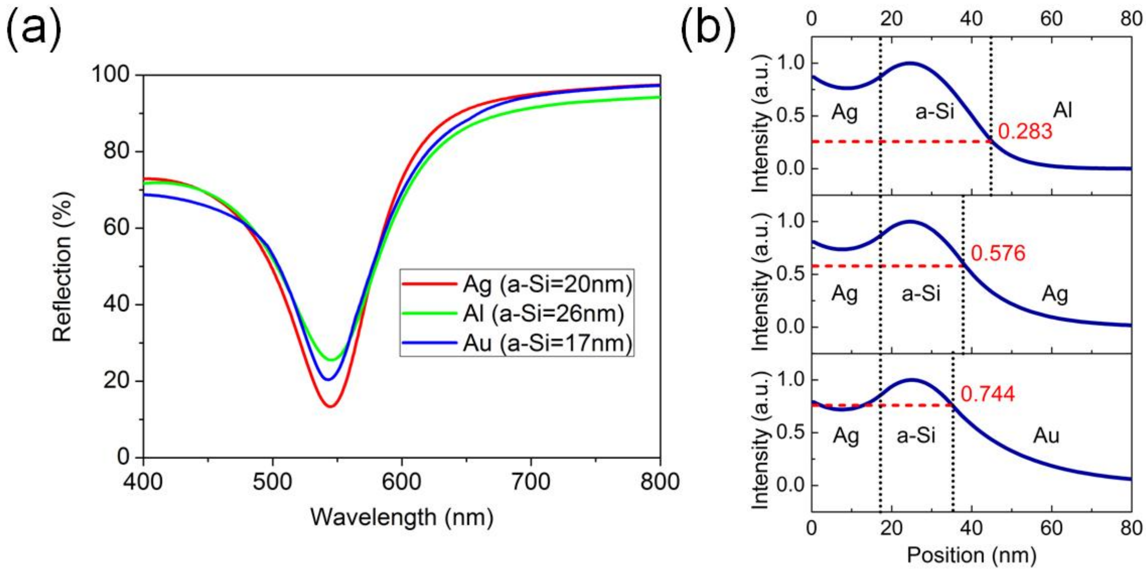

Figure S7. (a) Calculated reflection spectra obtained from different metallic substrates. (b) Normalized intensity distributions of the electric field at 550nm for different metallic substrates.