Supplemental Document

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Polarization discrimination and surface sensing with a near-IR nanostructured hybrid mirror: supplement

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Supplementary Materials

Polarisation Discrimination and Surface Sensing with a Near-IR Nanostructured Hybrid Mirror

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1. Achieving Higher Polarisation Extinction Ratio

The resonant reflectivity suppression and, correspondingly, the polarisation extinction ratio of the proposed nanostructured hybrid mirror can be increased to at least 50:1 in the case of Au nanograting with the period of 300 nm by reducing its height from 50 to 30 nm. We show this by modelling in Comsol Multiphysics the reflectivity spectra of the hybrid mirror in the two cases for a normally incident TE-polarised plane wave and comparing the obtained results in Figure 1S. We also plotted in Figure 1S the reflectivity spectrum measured experimentally for 50 nm high nanograting to demonstrate that our simulations produce an accurate prediction in terms of the magnitude of the reflectivity dip. The apparent shift and broadening of the dip seen in the experiment are the results of strong angular dispersion of Bragg reflectors, which comes into play under focussed illumination.

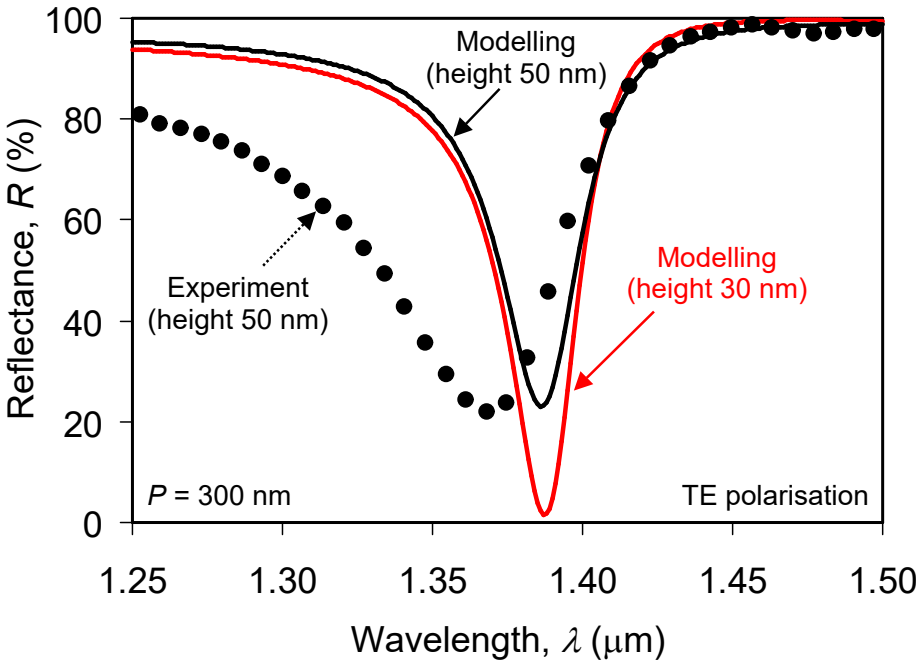

Figure 1S. Reflectivity spectra of a hybrid mirror featuring Au nanograting with the period of 300 nm; obtained for TM-polarised light. Dots – data measured experimentally, black solid line – data modelled for a 50 nm tall nanograting, red solid line – data modelled for a 30 nm tall nanograting.

2. Characteristics of Previously Reported Polarisation Discriminating Reflective Structures

Table 1S

Type of polarisation discriminating reflective structure	**$R_{\parallel}$ (%)**	**$R_{\perp}$ (%)**	**Extinction Ratio**	**Experiment/ Modelling**	**Ref**
Sub-wavelength Si relief grating	25	3	8:1	Experiment	[1]
Sub-wavelength Ag relief grating	96	45	2:1	Modelling	[2]
Sub-wavelength InP free-standing grating	99	50	2:1	Modelling	[3]
Diffractive Ta_2O_5 grating on Bragg reflector	97	50	2:1	Experiment	[4]
Diffractive Si grating on Bragg reflector	97	60	2:1	Experiment	[5]
Ga:ZnO metasurface (planar metamaterial)	45	2	23:1	Experiment	[6]
Sub-wavelength Au grating on Bragg reflector	99	12	8:1	Experiment	This work
Sub-wavelength Au grating on Bragg reflector	99	2	50:1	Modelling	This work

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