

(.) $\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \mathbf{X} = \frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix} = \frac{1}{\sqrt{2}} \begin{pmatrix} 2 \\ 0 \end{pmatrix} = \begin{pmatrix} \sqrt{2} \\ 0 \end{pmatrix}$

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 (.....)

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The radiation source and RSof BSDF file (via the RSof BSDF UDOP) were used in Light Tool to improve the overall device performance.

Figure 7 shows the illumination results. The blue line shows the emission ratio in air obtained with FIWAVE alone, and the green line shows the emission ratio in air obtained with Light Tool (which includes data from FIWAVE and Diffrac MOD). The results from Adachi et al. [3] and No (2010) [4] are also shown as a solid line. The FIWAVE illumination results show that the maximum coupling in the glass substrate is 55% and occurred for a cavity-EML separation, 'd', of 100nm. However, the maximum coupling in air is only 21% and occurred for 'd' of 600nm. This suggests that almost 34% of the light remained trapped in the glass substrate, which FIWAVE alone is unable to model due to its large thickness (1mm).



– the \mathbb{A}^1 -homotopy invariance of \mathbb{A}^1 -homotopy \mathbb{A}^1 -equivalences (Corollary 1.10).

The parameters of the structure are a wavelength of 0.46 μm, a period of 0.15 μm, a duty cycle of 0.26, a depth of 0.19 μm, and the grating and substrate are aluminum andapphire, respectively. This structure is implemented in Diffraction MOD, although FIIWAVE could also have been used. The generated BSDF, which contains polarization data, is shown in Light Tool in the following figure:

Figure 1: Directivity of the RSof BSDF UDOP

To mimic other approaches, the RSof BSDF file is also considered as a Light Tool BSDF and applied as a measured BSDF interface properly in Light Tool.

The polarization of the emitted light is measured by placing a rotating linear polarizer between the LED and the detector. The results from the two approaches are shown in Figure 12b. It is clear from the results that the Snop approach includes polarization and shows the theoretically predicted cosine-squared dependence (and is also closer to the experimental results in the reference). In contrast, the other approaches show complete unpolarized emission. The other approaches are therefore not suitable for LED emission polarization effects.

2.3.3.3. Summary

Modern optical and photonic design has common geometric features that are in the order of magnitude require a variety of numerical techniques to optimize their design and analyze their performance. A multi-scale simulation methodology that combines several techniques (FIIWAVE, Diffraction MOD, and Light Tool) has been presented. FIIWAVE used in the LED ULI is used to create an incoherent source for ray tracing, while Diffraction MOD is used to generate the BSDF for both the thin-layer OLED and the multi-layer grating on the glass-air interface. This information is then incorporated into a Light Tool simulation through ray data source and interface properly in interface, which permitted the full analysis of the device performance. Three cases are demonstrated: the use of the RSof BSDF UDOP allows for a complete data transfer between the EM simulation tool and ray-tracing tool, and allows for design and optimization of LED and OLED structures. Moreover, the adaptation of the RSof BSDF UDOP over the radiational BSDF approach is also demonstrated, including modeling of polarized LED.

References

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