Waveguide modes

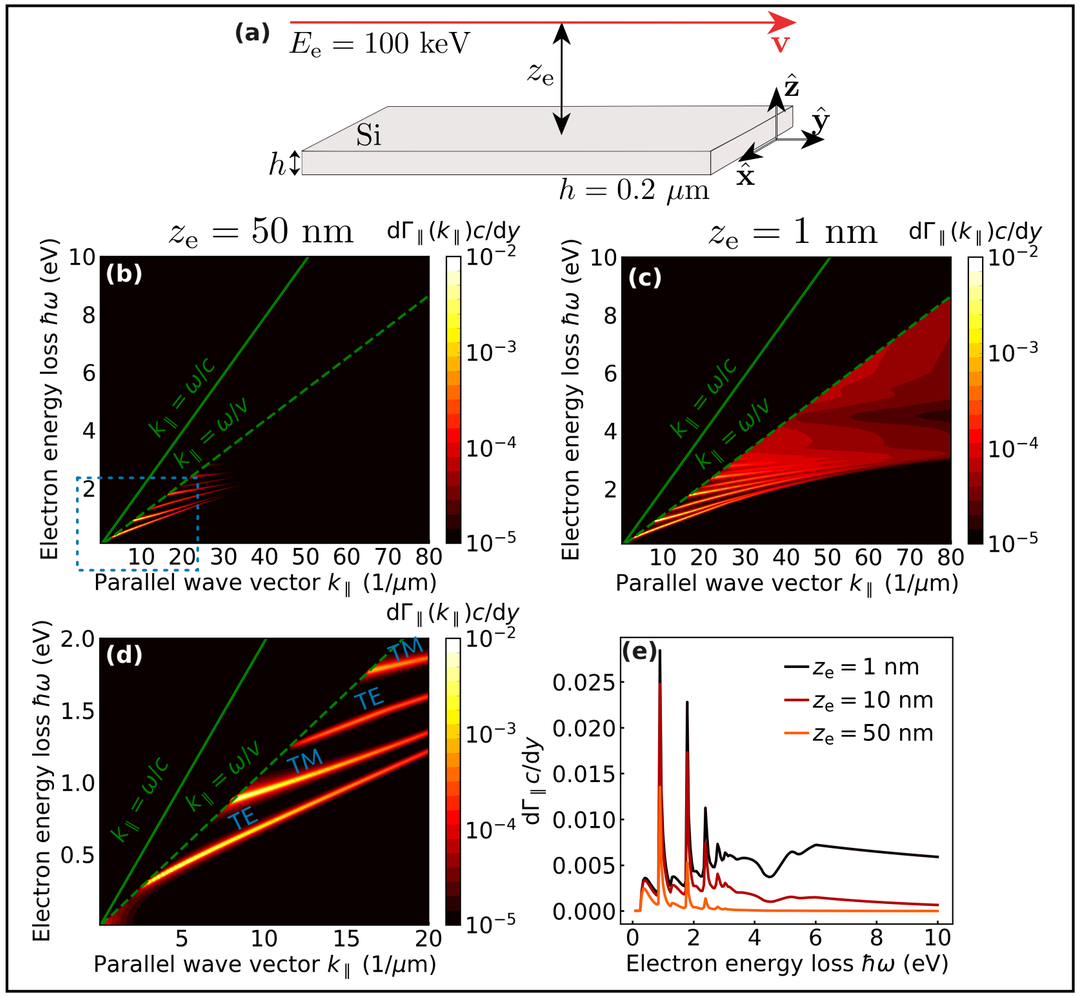
$$\frac{d\Gamma}{dy}(k_\parallel,\omega)=\frac{2e^2}{\pi\hbar v^2}\frac{k}{k_\parallel^2}\mathrm{Re}\left\{k_{z1}\mathrm{e}^{2\mathrm{i}k_{z1}z_\mathrm{e}}\left[\left(\frac{k_x v}{k_{z1}c}\right)^2 r^\mathrm{s}_{123}(k_\parallel)-\frac{1}{\epsilon_1}r^\mathrm{p}_{123}(k_\parallel)\right]\right\},$$

Integration

$$\frac{d\Gamma}{dy}(\mathbf{r},\omega)=\frac{2e^2}{\pi\hbar v^2}\int_0^\infty\frac{\mathrm{d}k_x}{k_\parallel^2}\mathrm{Re}\left\{k_{z1}\mathrm{e}^{2\mathrm{i}k_{z1}z_\mathrm{e}(\mathbf{r})}\left[\left(\frac{k_x v}{k_{z1}c}\right)^2 r^\mathrm{s}_{123}(k_\parallel)-\frac{1}{\epsilon_1}r^\mathrm{p}_{123}(k_\parallel)\right]\right\},$$

Electron parallel to the plane

Fig. 1



$$r^\nu_{123}=r^\nu_{12}+\frac{t^\nu_{12}t^\nu_{21}r^\nu_{23}\mathrm{e}^{2\mathrm{i}k_{z2}h}}{1-r^\nu_{21}r^\nu_{23}\mathrm{e}^{2\mathrm{i}k_{z2}h}},$$

$\epsilon_2(\omega)+\mathrm{i}10^{-1}$ Si from Aspnes