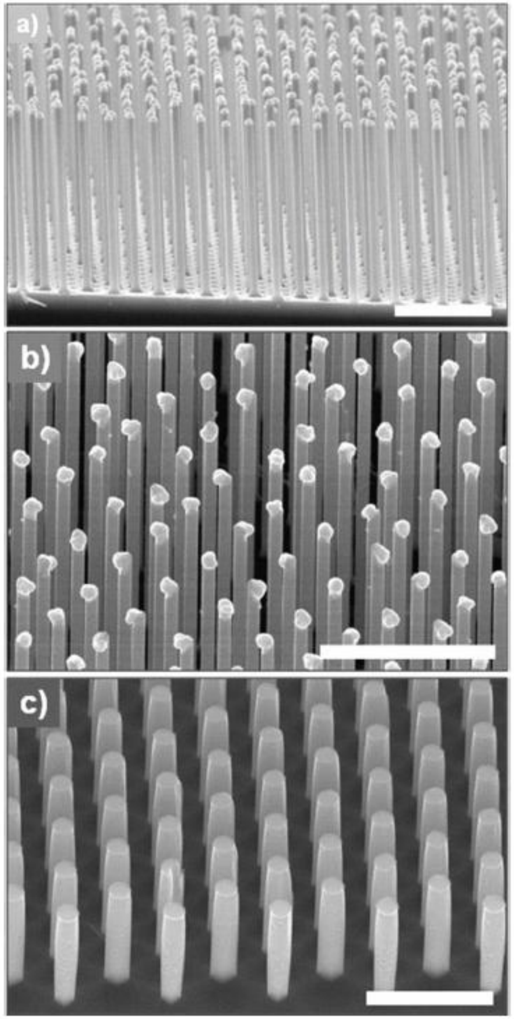

Fig. 2. Examples of Si wire arrays fabrication (a) by VLS, using a Cu catalyst, (b) by VLS, using a Ni catalyst, and (c) by RIE. The scale bar is 20 μm in each case.

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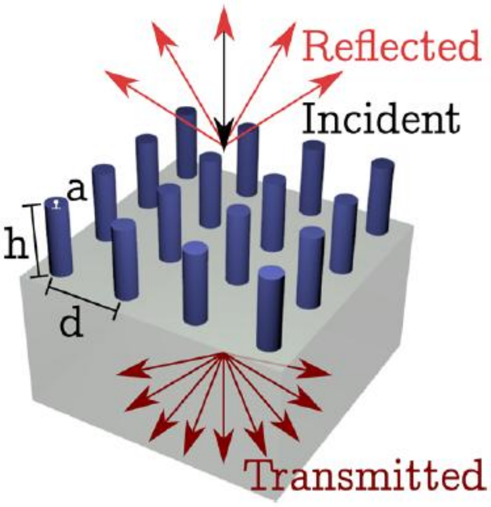
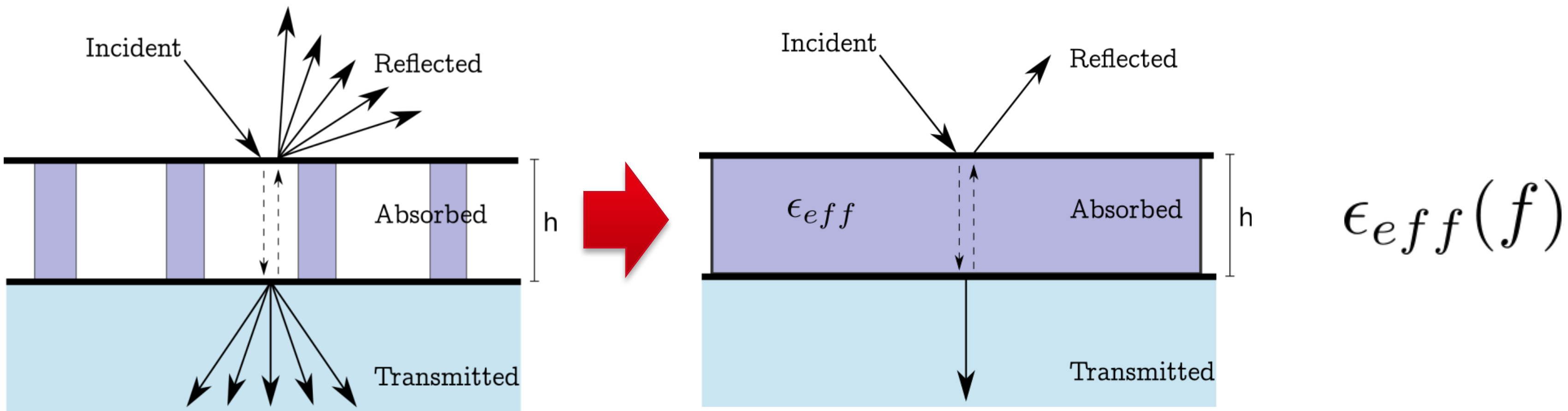
- Periodic array, invariant in vertical direction
- High index nanowire inclusions
- Average if $\lambda \gg d$—get effective refractive index suppress diffraction
- Standard approaches:
  - Maxwell Garnett,
  - Bruggeman,
  - volume averaging.





Nanowires: Re(Bruggeman) + Im(Volume Averaging Theory)

$$(1-f_v)\frac{n_c^2-n_{eff}^2}{n_c^2+2n_{eff}^2}+f_v\frac{n_d^2-n_{eff}^2}{n_d^2+2n_{eff}^2}=0$$

$$n_{eff}^2=\frac{1}{2}\left[A+\sqrt{A^2+B^2}\right]$$

$$A=f_v(n_d^2-k_d^2)+(1-f_v)(n_c^2-k_c^2)$$

$$B=2n_dk_df_v+2n_ck_c(1-f_v)$$

N. J. Hutchinson, *et al.* Thin Solid Films, 518, 2010