

## Supplementary Information

# Superenhancers: Novel opportunities for nanowire optoelectronics

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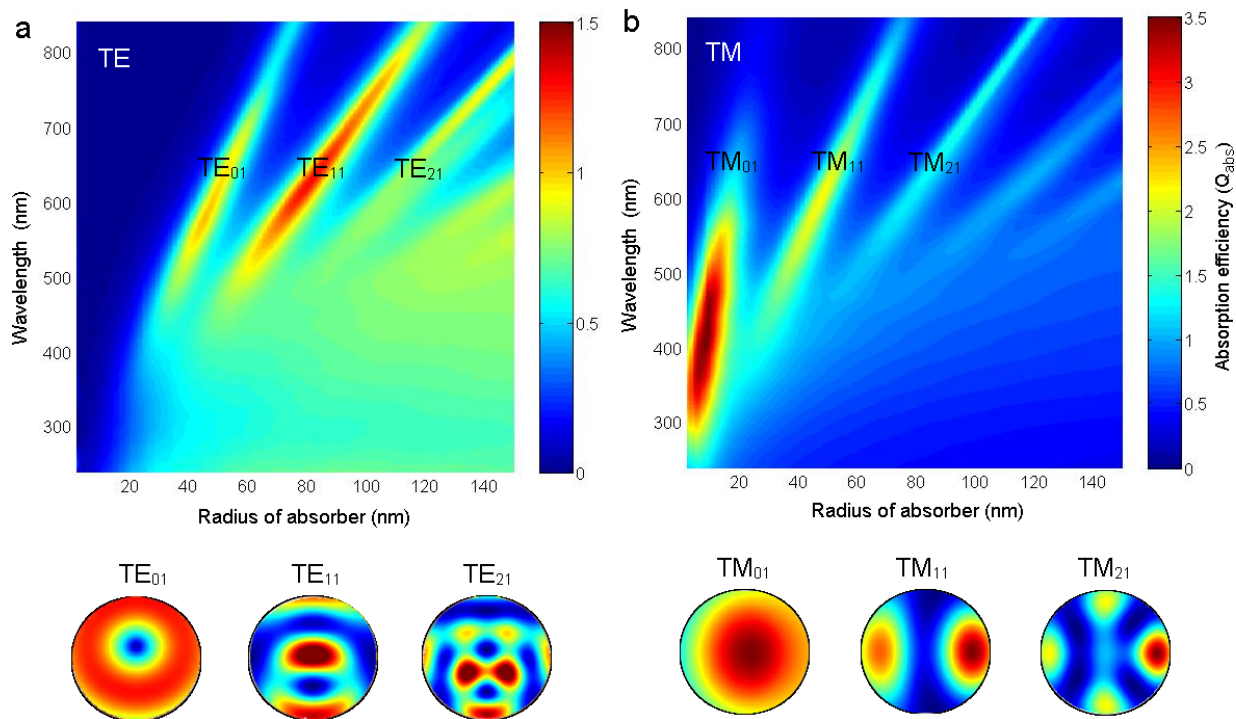
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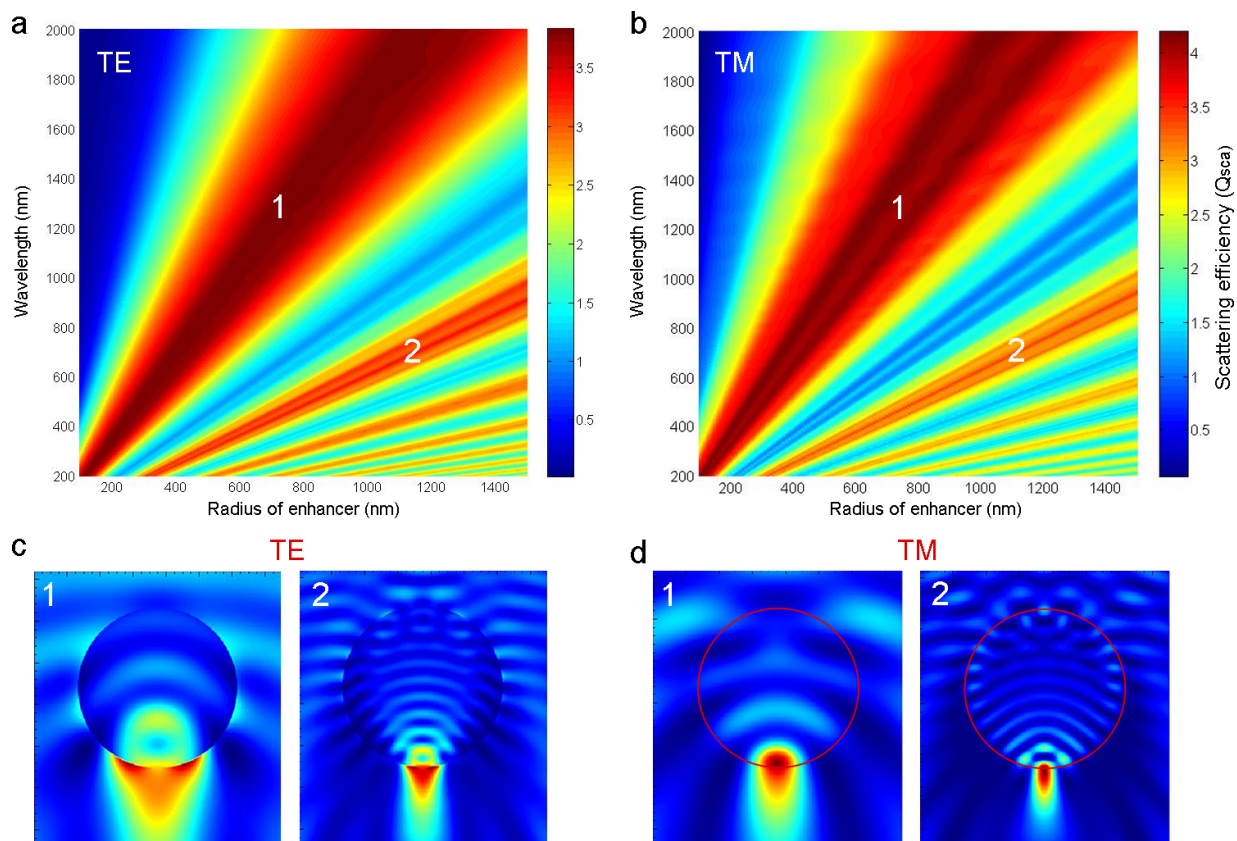
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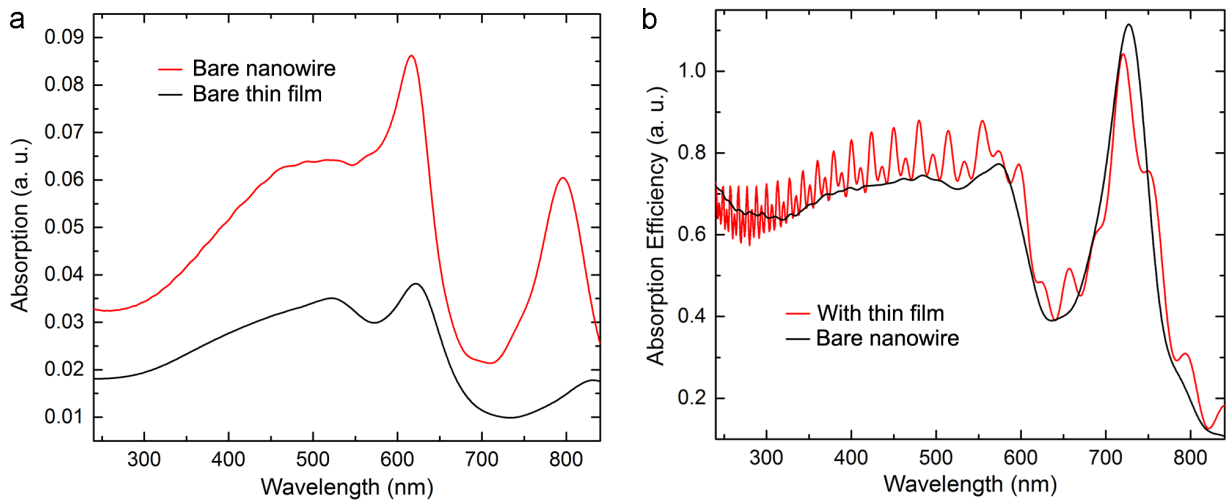
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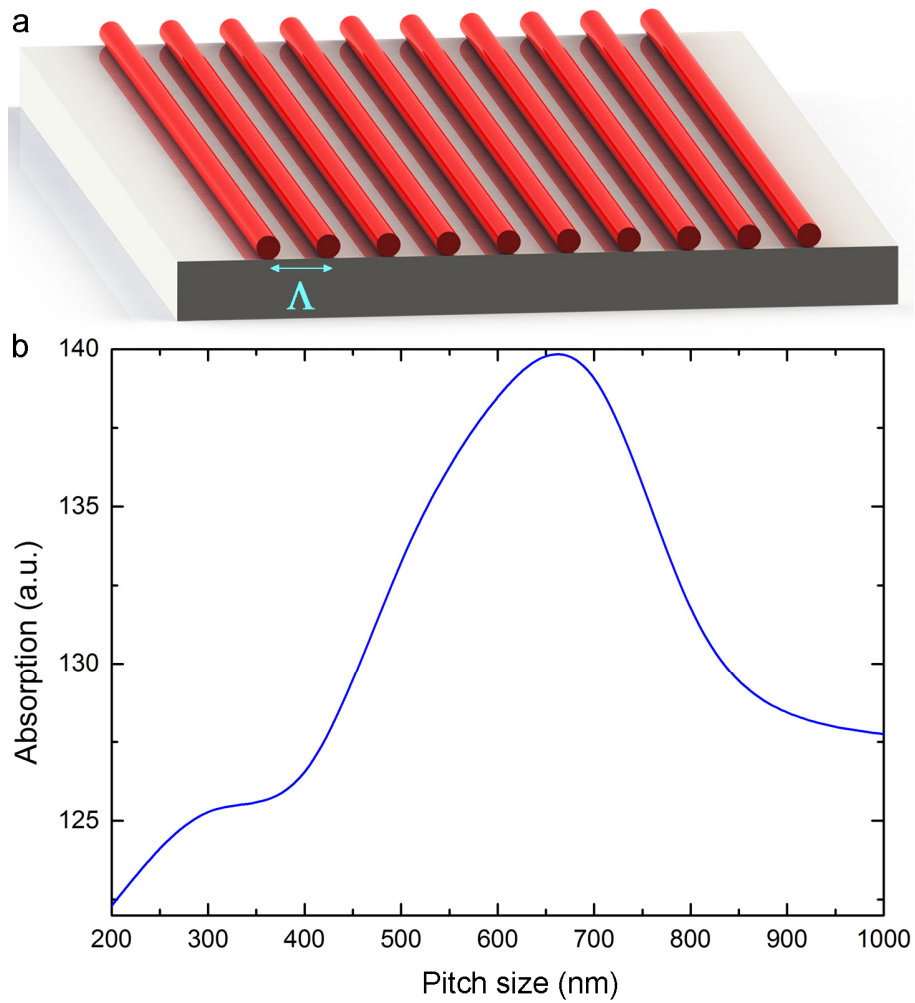
**Figure S1 | Resonant Mie absorption.** (a,b) Nanowires exhibit resonant absorption behaviour when their size match with at the very least one of TE and TM polarization modes. In TE polarization, resonances appear on larger core sizes with lower absorption efficiencies compared to TM polarization.



**Figure S2 | Non-resonant Mie scattering.** (a,b) Light scattering from low-index wavelength scalable nanowires is recently described in context of non-resonant form of Mie scattering where optical resonances disappear and scattering spectrum is significantly broad and exhibits polarization independency. (c,d) As a unique feature of this regime, scattering is strictly in forward direction and exhibit focusing behaviour. All these features are highly desirable in absorption enhancement applications yet they do not exist simultaneously in other well-known light trapping techniques.



**Figure S3 | Thin film effects. (a)** Square nanowire exhibits more than 2-fold better absorption performance than same volume of absorber thin-film thanks to characteristic leaky-mode resonances. **(b)** Higher orders of conventional thin-film interference effect appear as a rapid oscillation peaks on absorption spectrum of nanowire.



**Figure S4 | Effect of pitch size in absorption of bare nanowire arrays. (a)** For large-area applications nanowire array should be arranged with proper spacings for its maximal absorption performance. **(b)** Optimal pitch sizes are found to be in 600-700 nm range.