

Absorption enhancement by matching the cross-section of plasmonic nanowires to the field structure of tightly focused beams

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Abstract: Nanostructured materials, designed for enhanced light absorption, are receiving increased scientific and technological interest. In this paper we propose a physical criterion for designing the cross-sectional shape of plasmonic nanowires for improved absorption of a given tightly focused illumination. The idea is to design a shape which increases the matching between the nanowire plasmon resonance field and the incident field. As examples, we design nanowire shapes for two illumination cases: a tightly focused plane wave and a tightly focused beam containing a line singularity. We show that properly shaped and positioned silver nanowires that occupy a relatively small portion of the beam-waist area can absorb up to 65% of the total power of the incident beam.

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