Nonlinear Optical Extinction and Harmonic Generations in Silver Nanowires Array

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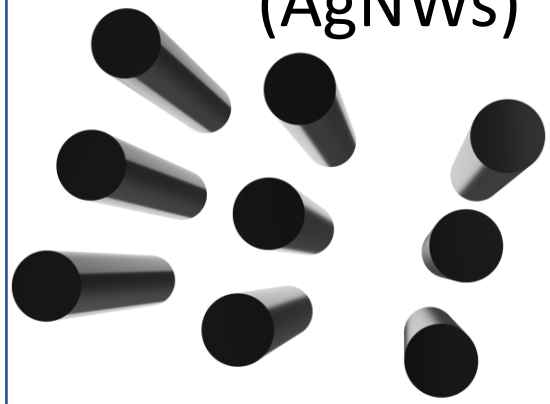
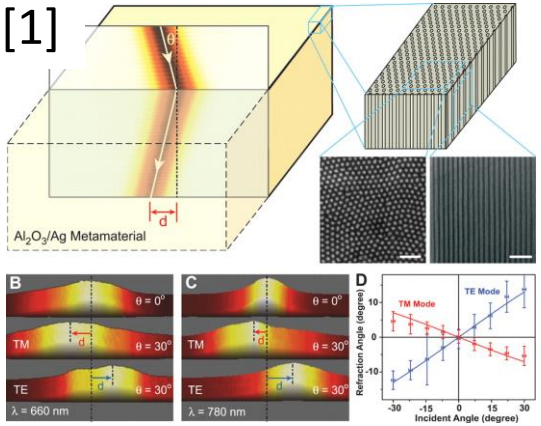
Introduction | Theory | Setup | Results | Conclusion

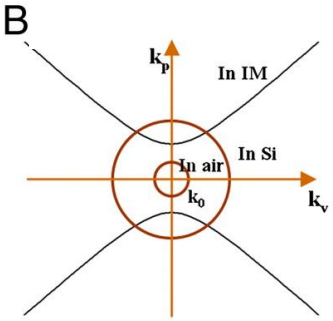
Silver Nanowires Array (AgNWs)

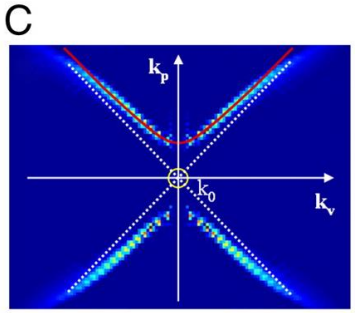


[1]



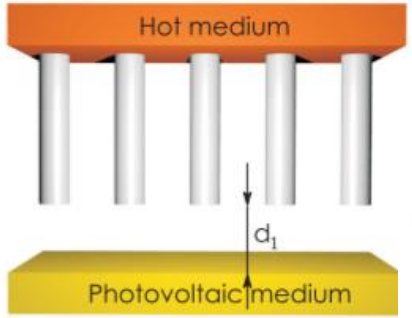
[2]





Applications of AgNWs

[3]



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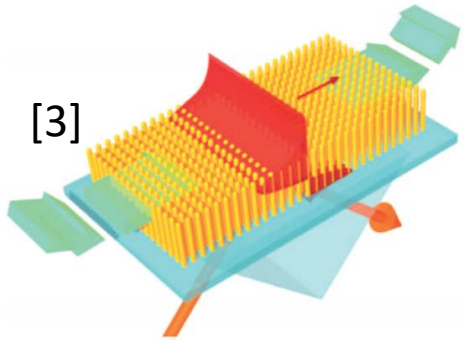

References

[1] *Science* 15 Aug 2008: Vol. 321, Issue 5891, pp. 930

[2] PNAS, Jul 2011, 108 (28) 11327-11331

[3] *Adv. Mater.*, vol. 24, no. 31, pp. 4229-4248, Aug. 2012.

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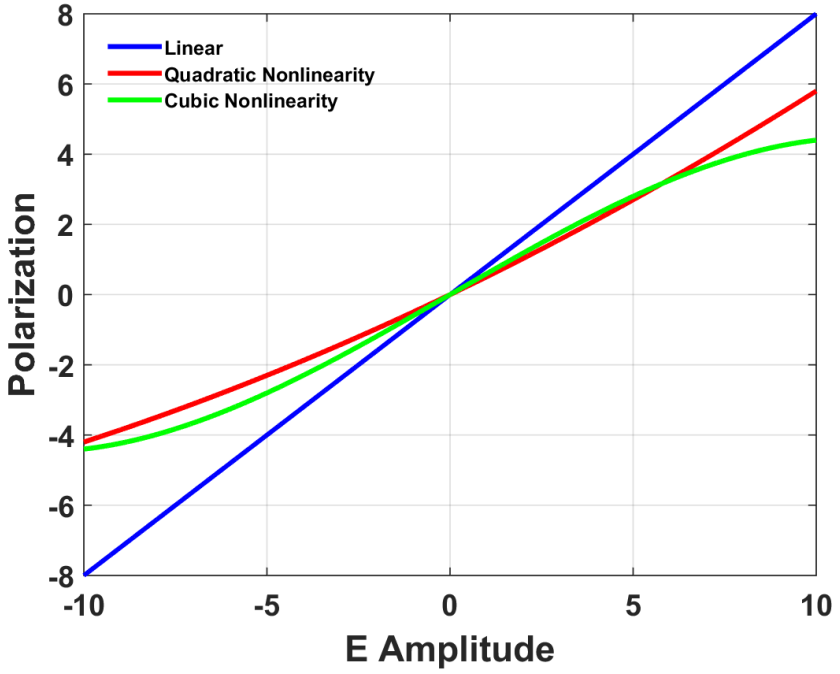
Nonlinear optics

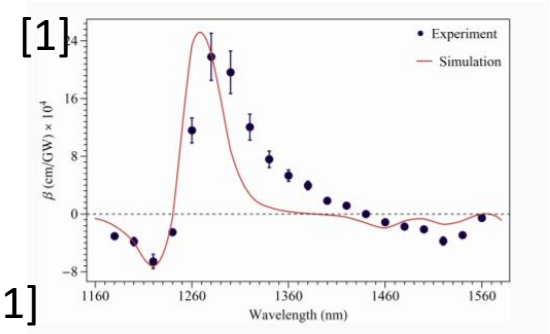
$$\boldsymbol{P}(t) = \varepsilon_0\chi^{(1)}\boldsymbol{E}(t) + \varepsilon_0\chi^{(2)}\boldsymbol{E}^2(t) + \\ + \varepsilon_0\chi^{(3)}\boldsymbol{E}^3(t) + \cdots +$$



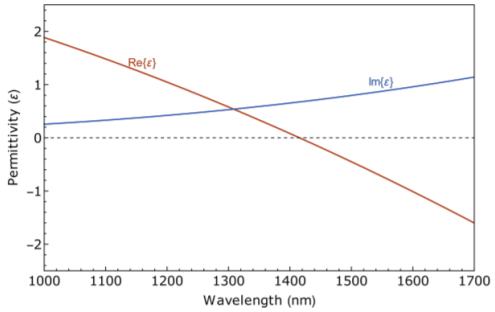
Nonlinear Optical Absorption and Harmonic Generation

$$\alpha(I) = \alpha_0 + \alpha_2 I + \alpha_4 I^2 + \alpha_6 I^3$$

[1]

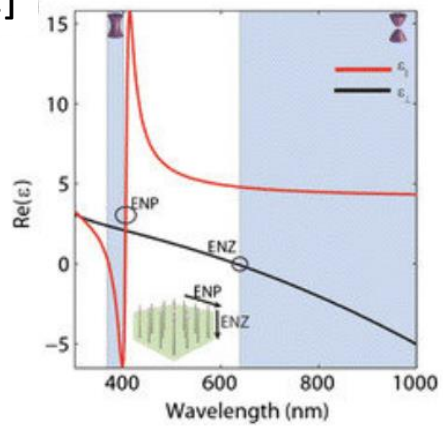


[1]



Field enhacement nonlinearity
Couple modes in metamaterial

[2]



[1]Nature Photonics **volume 12**, p.79–83(2018)

[2] Nano Convergence, V**1**, Article number: 14 (2014)

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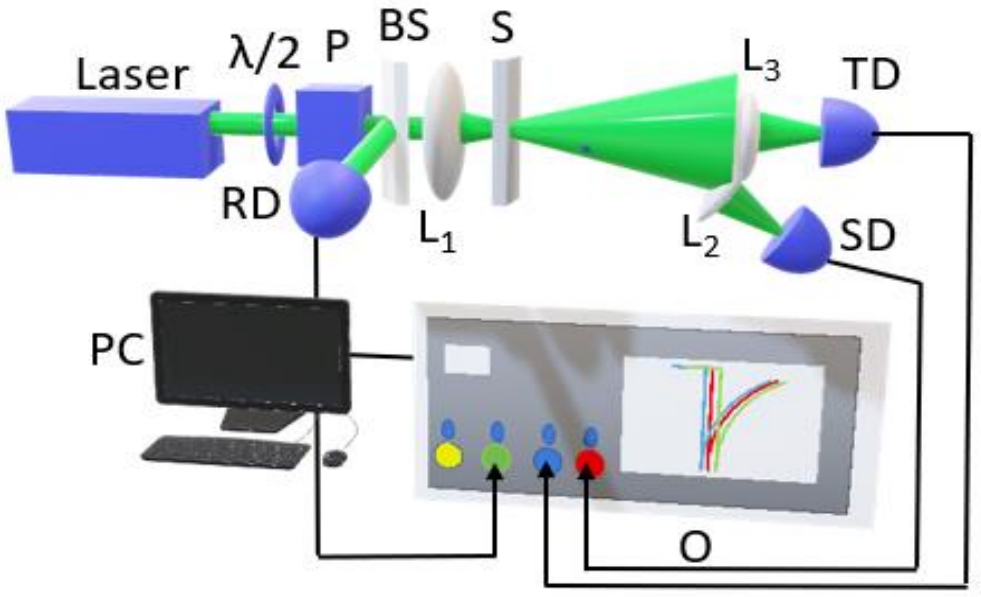
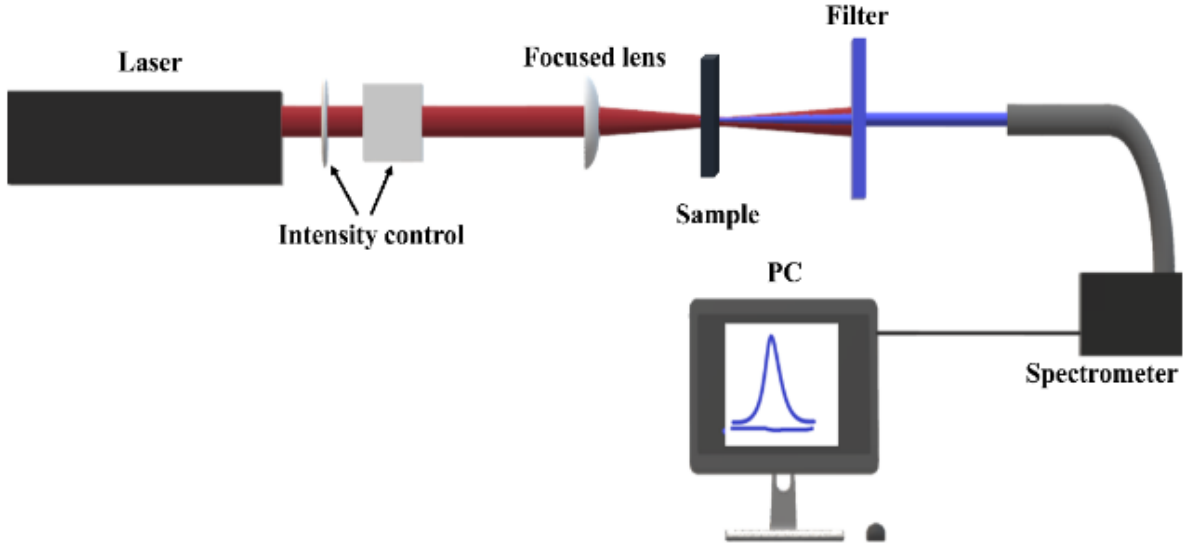
Experimental Setup for Optical Limiting and Harmonic Generation





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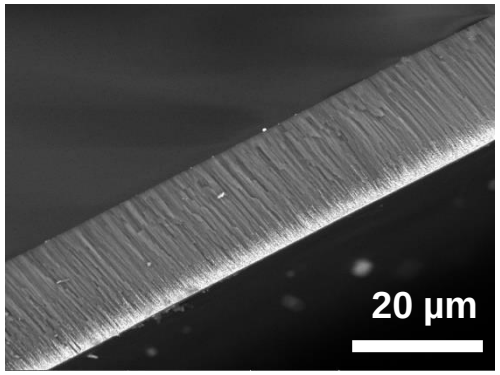
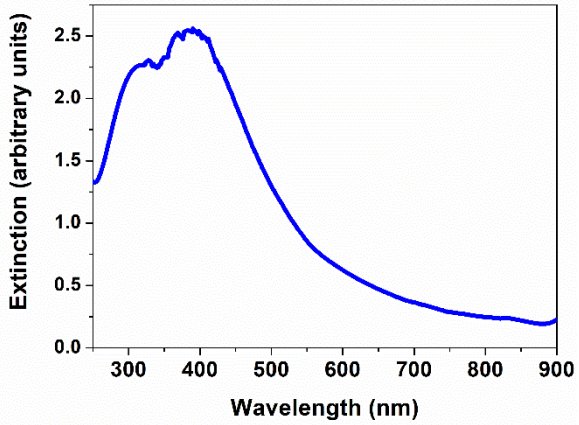
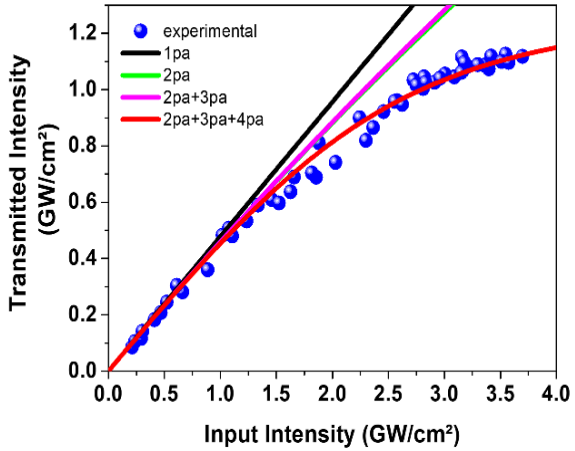
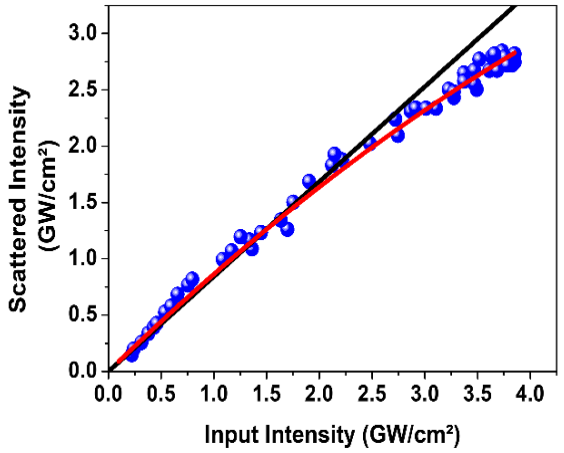
Optical Limiting

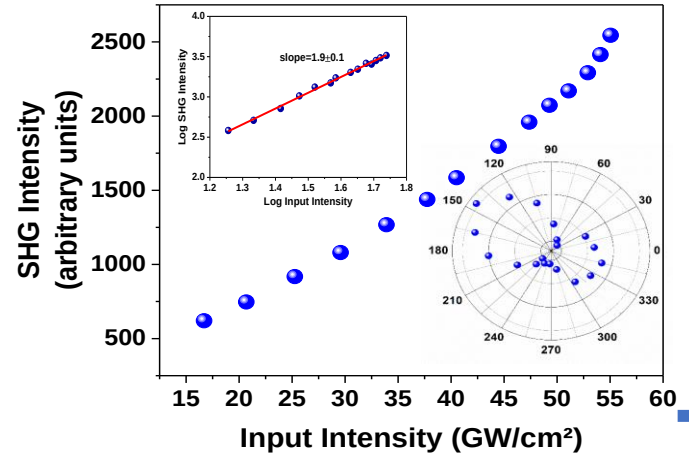


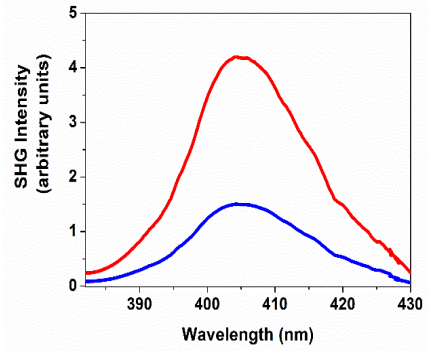






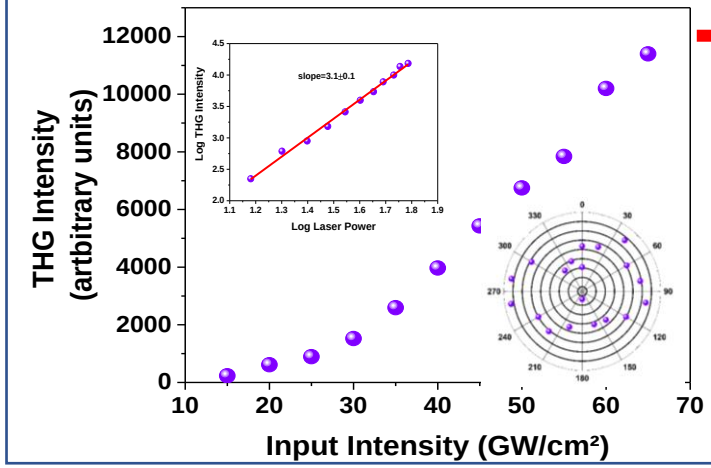
SHG and THG

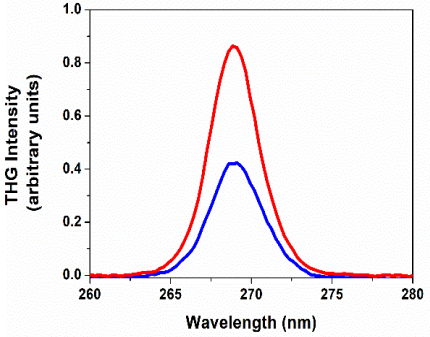




0º incidence

30º incidence





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1. High – order optical limiting properties are found in a silver nanowire array embebbed in an anodic alumina membrane;
2. Second and Third Harmonic Generation are shown for the first time for this system;
3. The Intensity of the SHG and THG increase when the excitation is not parallel to nanowires in ENZ and Hyperbolic regimes.

Contacts:
Manoel L. Silva-Neto: manoel.leonardon@ufpe.br