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Enhanced Optical Nonlinearity in Lycopene Bioconjugated Ag Nanoparticles

Abstract

It has been shown that lycopene molecules have a substantial nonlinear optical third order susceptibility, ⊠(3), because of their double bond conjugated electronic structure. It is demonstrated that natural Lycopene has a markedly higher 3rd order nonlinearity, ⊠(3), as high as 2.65 10−6 esu, the highest value of any natural phytocompound studied to date, including β-carotene [1]. This is correlated with its 1-D conjugated π-electrons linear shape. Silver nanoparticles bio-conjugated lycopene is confirmed to demonstrate an additional improvement in both linear and nonlinear optical characteristics in this contribution. This later significant additional NLO improvement appears to be opening up a possible application in photodynamic treatment in particular and biophotonics in general.

References

[1] N. Numan, S. Jeyaram, K. Kaviyarazu and M. Maaza. Scientific Reports. 12 (2022) 9078.

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