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Two Photon Absorption and carrier generation in semiconductors

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Silicon is transparent to low intensity laser light with wavelength bigger than 1100 nm: Photon wavelength is beyond the energy gap so there is no possible linear quantum absorption.
Only at the focal point, light intensity can be high enough to switch to simultaneous absorption of two photons with half the gap energy each. This nonlinear absorption opens up a new technique for pair generation in semiconductors, particularly in semiconductor devices. The carrier generation is limited to the focal point, due to the intensity dependence of the absorption cross section, with the remnant device transparent to laser light beyond 1100 nm. With high precision optics, the focal point can be moved inside the device, effectively moving a carrier generation small volume along the device. That small carrier volume can be used to probe the electric field inside the device.

Summary

On the physics of two photon laser light absorption in semiconductor devices and its use for electric field probing with a movable small carrier generation volume.

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