



Hot plasmon dynamics in broadband plasmonic structures

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Hot carrier dynamics especially plasmon mediated hot electron dynamics are of current interest as they help transfer energy within few 10s of femtoseconds [1,2]. Novel applications including energy harvesting, photodetection, and sensors are proposed based on hot carrier injection. Plasmonics has become ubiquitous due to possible applications of strong local field confinement. Plasmonic structures are, mostly, periodic metal-dielectric structures having sub-wavelength patterns that offer discrete resonances. Metal nanoparticle resonances also depend on the size, shape and matrix. So, the dynamics studied so far are in plasmonic systems with discrete resonances. One of our earlier studies showed that the ultrashort lifetime of plasmons distorts the short pulse profile [3].

In addition to hot carrier dynamics, for modulating and controlling ultrashort laser pulses, it would be interesting to study broadband, dispersionless plasmonic systems. We have developed one such structure, a plasmonic quasicrystal [4] in which we showed both linear and nonlinear response over broadband. In this talk, I will summarize some of our recent results on ultrafast dynamics of hot plasmons, how they effect low energy plasmons as well as ultrashort pulse interaction with PIQC structures.

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