Dispersive resonators for THz intersubband polaritons

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Intersubband polaritons are mixed states, partially microcavity photon and partially material excitation. We demonstrate strong coupling between a THz intersubband transition and the fundamental cavity mode of a metal-insulator-metal resonator. Patterning of the resonator surface enables surface coupling of the radiation and introduces an energy dispersion which can be probed with angle-resolved reflectivity. Note: the polaritonic dispersion presents an accessible energy minimum at k=0. As a first approach, we have characterized the system at a fixed incidence angle of 15° and at low temperature. We have found a minimum Rabi splitting of 16%, with a central frequency of 2.5 THz. The agreement between experiment and simulations is good, and it permits also to precisely gauge the exact doping of the semiconductor sample. The perspective of this work is to understand THz polariton's scattering mechanisms. These mechanisms will be observed using a pump and probe experiment.

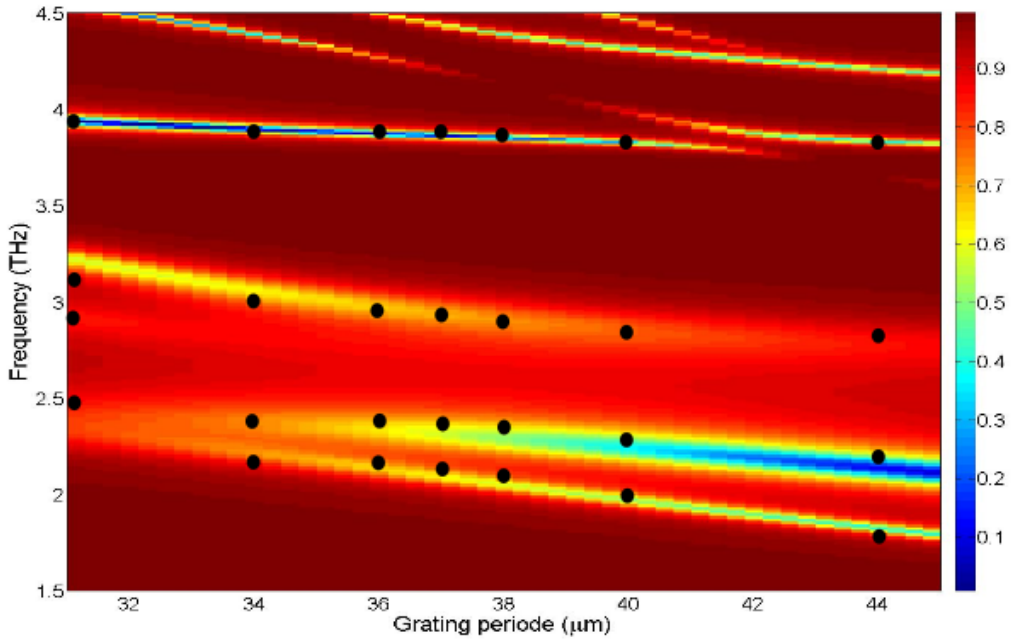

Figure 1: Comparison between experimental absorption peaks (black dots) and dispersion simulations for different gratings on the same heterostrucutre at 2.5Thz