325. Title:Exciton Mott transition in Si studied by terahertz spectroscopy
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Abstract:We have investigated the exciton Mott transition in a bulk Si by optical pump and terahertz probe spectroscopy under quasi-thermal equilibrium condition. The 1s-2p transition energy of excitons in Si that locates around 12 meV (∼3 THz) is directly probed by the broadband terahertz pulses. The resonance energy of the 1s-2p transition stays unchanged with increasing the photo-excited electron-hole (e-h) pair density. The resonance structure sustains even above the Mott density, although broadened, in contrast to the conventional picture of the exciton Mott transition where the exciton binding energy vanishes toward the Mott density. The results indicate the existence of excitonic correlation in the metallic electron-hole plasma phase.