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Thermal near-field: spectroscopy of the resonant enhancement of the local electromagnetic density of states BRIAN O'CALLAHAN, WILLIAM LEWIS, University of Colorado Boulder, ANDREW JONES, Femtolasers, MARKUS RASCHKE, University of Colorado Boulder — One of the most universal physical processes shared by all matter at finite temperature is the emission of thermal radiation. Associated with the well understood far-field radiation and its spectral characteristics, recent theoretical work has shown that the corresponding near-field can exhibit distinct spectral, spatial, resonant, and coherence properties. The electromagnetic local density of states (EM-LDOS) is a fundamental quantity determining these properties. We demonstrate the technique of thermal infrared near-field spectroscopy (TINS) to characterize the unique spatial and spectral properties of the thermal near-field by scattering with a nanoscale probe. In particular, we discuss the observed vibrational and phonon-resonant enhancement and relationship with the underlying EM-LDOS. We also demonstrate the sensitivity of the emitted spectra to local dielectric environment, tip-sample coupling, and antenna effects of the scanning probe tip.

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