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Terahertz ellipsometry using electron-beam based sources T. HOFMANN, Department of Electrical Engineering, University of Nebraska-Lincoln, USA, U. SCHADE, BESSY mbH, Berlin, Germany, M. MROSS, T. IOWELL, Vermont Photonics Technologies Corporation, Bellows Falls, Vermont, USA, M. SCHUBERT, Department of Electrical Engineering, University of Nebraska-Lincoln — Spectroscopic ellipsometry is known as a viable and precise technique for the investigation of optical material properties in the far-infrared to the VUV spectral region. Generalized ellipsometry in the THz frequency domain allows in combination with strong magnetic fields at low temperatures investigation of low energy electron dynamics in semi- and superconducting materials. We report here on the first successful application of this technique to investigate condensed matter samples in the frequency range from 0.7 to 8 THz using a high-brilliance Terahertz synchrotron radiation source and a Smith-Purcell-effect Terahertz radiation source. We discuss and present THz range physical material properties due to bound and unbound charge resonances in low-dimensional semi- and superconducting materials. This research will provide understanding of optical properties for novel materials, inspire new designs, and accelerate development of optical Terahertz devices.

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