Beamline U12IR (National Synchrotron Light Source) utilizes infrared synchrotron radiation from a bending magnet. A combination of beamline design features and spectroscopic instrumentation allows the facility to reach the extremely low frequency limit of \( \sim 2 \text{ cm}^{-1} \) (\( \equiv 60 \text{ GHz} \) or \( 250 \mu\text{eV} \)) at rather high resolution. A 16 T magnet is also available.

The high brightness of the synchrotron emission yields substantial benefits for the study of small (mm-sized) samples. Below \( 20 \text{ cm}^{-1} \) the synchrotron radiation is more intense than that from a high-pressure mercury lamp.

A key feature of the beamline is a facility for sub-nanosecond time-resolved (pump-probe) infrared spectroscopy. (This capability may also be applied to the infrared–visible at U10B.) A mode-locked Ti:sapphire laser produces near-IR or (with doubling) visible pump pulses synchronized to probe pulses from the synchrotron. The broadband infrared from the synchrotron allows the entire spectral range from 2–20,000 cm\(^{-1}\) (0.25 meV–2.5 eV) to be probed. A temporal resolution of 200 ps, limited by the infrared synchrotron-pulse duration, may be achieved. A maximum time delay of 170 ns is available without gating the infrared detector.

Data from the beamline from studies of semiconductors and superconductors will be presented.

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