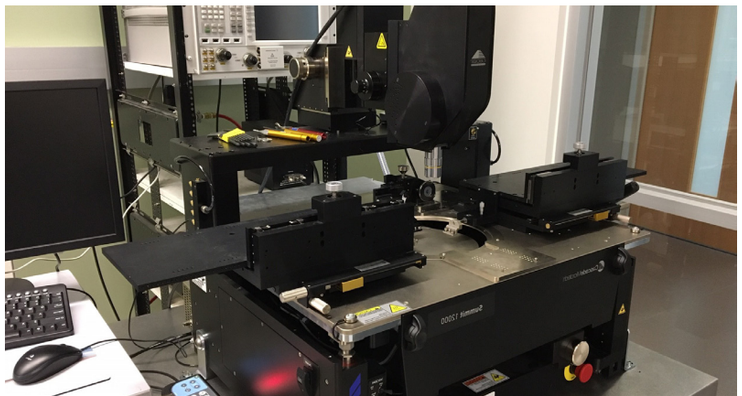
High Frequency Sensor Development



umass.edu/ials/high-frequency-sensor

Located on the 4th floor in the Life Science Laboratories the High Frequency Sensor Development facility offers cutting-edge capabilities including a probe station with network analyzer and extenders for measurements up to 1.2 THz, a fourier transform spectrometer for THz/IR spectral analysis of materials, and a tunable pulsed laser operating from 0.8 to 2.5 THz. The lab also includes a variety of auxiliary equipment such as oscilloscopes, spectrum analyzers and power supplies.

We offer training to users to conduct experimentation for use on a fee for service basis to both internal and external researchers, academic or industry based. Following an initial consultation, covering experimental parameters training and access is arranged through the director.

ACCESS

To request access, training, or additional information please contact Joseph Bardin at jbardin@umass.edu or Robert Jackson at jackson@ecs.umass.edu.

Our rates are competitive and tiered based on needs and usage. Visit our website at *umass.edu/ials/high-frequency-sensor* for current listing.

TRAINING

Training for new users consists of:

- lab safety training,
- operation of the instrument and associated software,
- use of data analysis software,
- exporting or presenting data,
- clean up and shutdown of the instrumentation.

Once the training is complete, researchers may schedule their experiments through the directors of HFSD (Joseph Bardin or Robert Jackson) or online through FOM (Facilities Online Manager) at *fom.umass.edu/fom*

UMassAmherst | Core Facilities

Institute for Applied Life Sciences
University of Massachusetts Amherst
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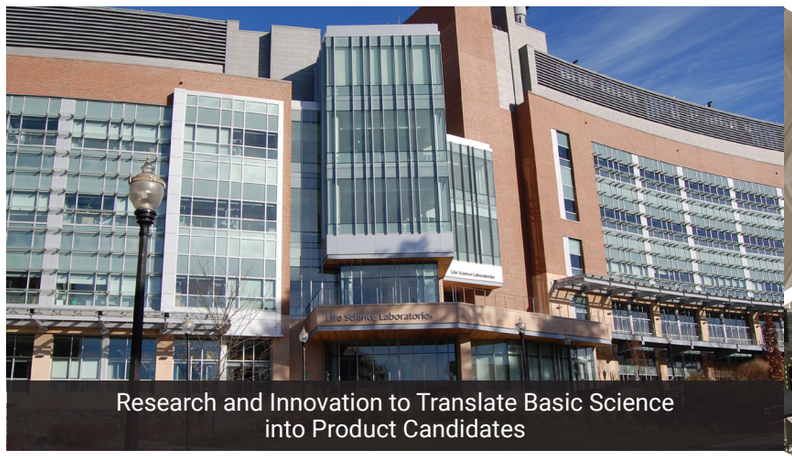
240 Thatcher Road
Amherst, MA 01003



Research and Innovation to Translate Basic Science into Product Candidates

PARTNER WITH US!

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Revision (01/29/19)

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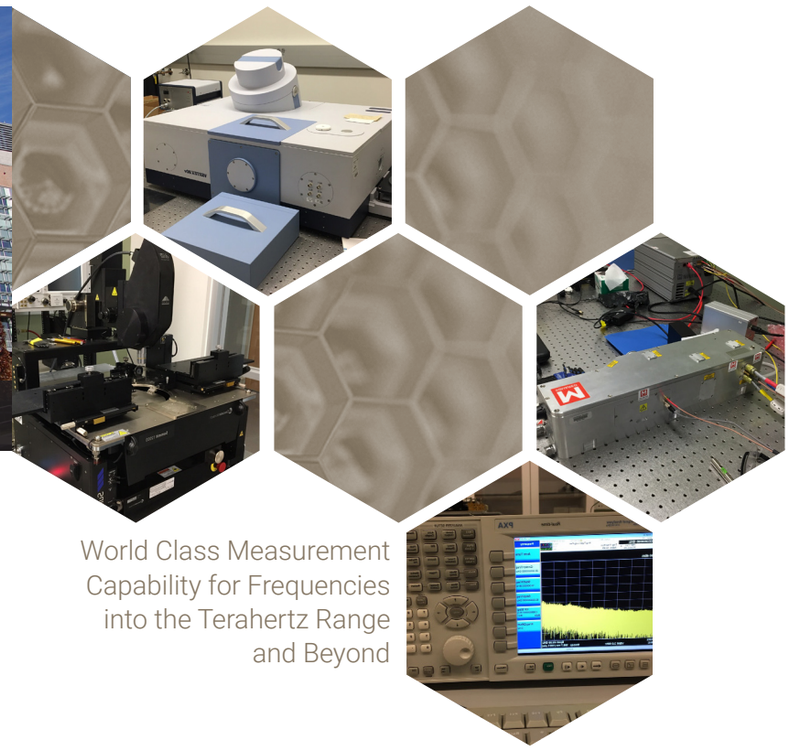
High Frequency Sensor Development

Institute for Applied Life Sciences
University of Massachusetts Amherst

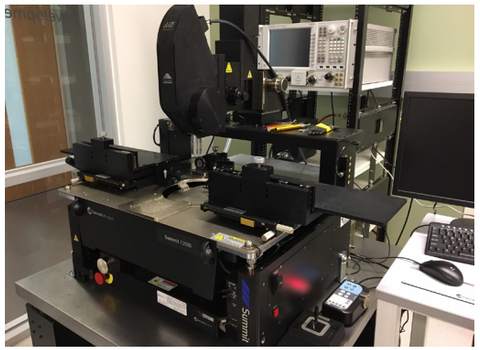


World Class Measurement Capability for Frequencies into the Terahertz Range and Beyond

EQUIPMENT

Keysight/Cascade Probe Station for Network Analysis to 1.1THz

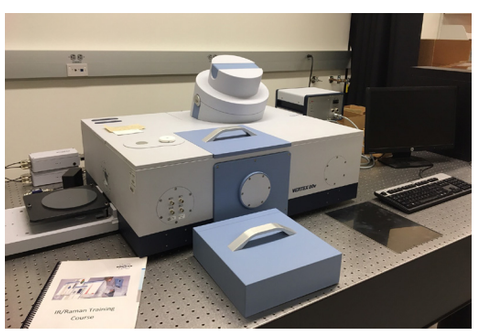
For use in characterizing devices and integrated circuits operating up to Terahertz frequencies



- Microwave network analyzer, Keysight N5247A PNA-X, 0.01-67 GHz (options 080, 400, 419, H01)
- VNA frequency extenders, 70-1100 GHz (VDI, WR10, WR6.5, WR4.3, WR3.4, WR2.2, WR1.5, WR1.0)
- Probe station, Summit 12000B-M 200 semi-auto microchamber. Large area manipulators and E-Vue microscope
- Dominion wafer probes for WR4.3, WR3.4, WR2.2, WR1.5, WR1.0 bands (2 ea)
- VDI calibration kits (WR10, WR6.5, WR4.3, WR3.4, WR2.2, WR1.5, WR1.0)

Bruker Vertex 80 Fourier Transform Spectrometer

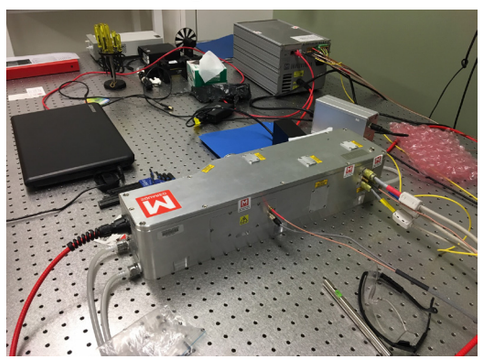
For use in characterizing materials such as polymers, pharmaceuticals, semiconductors



- Spectral range from very far IR (THz) to near IR, visible and UV
- Standard resolution better than 0.2 cm^{-1}
- PC-based data system controls optics and signal processing
- Sources
  - ◊ MIR standard internal, Globar
  - ◊ NIR/UV internal, tungsten lamp (Q428/7)
  - ◊ FIR external, Hg arc (Q201), to 4cm^{-1}
- Detectors
  - ◊ MIR KBr/DLaTGs D301, room temp
  - ◊ NIR/MIR MCT D316, LN temp
  - ◊ VIS/NIR Si D510, room temp
  - ◊ FIR(to 150 GHz), IRLab bolometer, 4.2°K
- Beam splitters for entire range in steps
- Temporal resolution to 6mS
- Reflection accessories: Bruker,13°-83° computer-controlled angle adjustment, Pike 30° angle, horizontal sample position

Firefly Pulsed THz Laser

A compact tunable THz source useful for spectroscopy, non-destructive testing, biomedical diagnostics, and THz detector testing

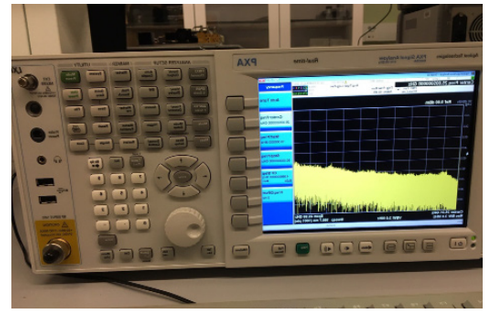


- Output Pulse Energy > 9 nJ at 50 Hz
- Tuning Range 0.8 to > 2.5 THz
- Repetition Rate 50 Hz (fixed, nominal)
- Pulse Duration < 25 ns (FWHM)

Additional Equipment

High Frequency Measurements

- Signal Analyzer 50 GHz Agilent (N9030A, options B1X, BBA, CR3, EXM, P50, RT2, 1FP, 2FP, 9068A, 9069A, 1FP, 2FP)
- Noise source 26GHz, Agilent N4002A
- Signal generator 50 GHz Agilent, E8257D (options 1E1, 550, UNW, UNX)
- Multipliers, VDI 650 and 850 GHz
- E-calibration module,Agilent N4694A.
- Power meter Erickson PM4, with waveguide flange adapter kit
- Power meter, Agilent E4416A (2)
- Power sensors, Agilent (N8485A, E4413, N8488A, 8487D, W8486A)
- Supporting waveguide equipment (2x horns and 2x 1" waveguide for WR10, WR6.5, WR4.3, WR3.4, WR2.2, WR1.5, WR1.0 and variable attenuators for WR10, WR6.5, WR4.3, WR3.4, WR2.2 and WR1.5).
- THz to MIR Golay cell detector, Tydex
- FIR bolometer (to 150 GHz), IRLab, 4.2°K



Scientific Instrumentation

- SRS Small Instrument Modules: SIM910 JFET preamplifier, SIM918 Precision current preamplifier, SIM954 Dual-channel 300 MHz inverting amplifier, SIM965 Bessel and Butterworth filter, SIM923 Platinum RTD monitor, SIM928 Rechargeable isolated voltage source, SR540 Optical chopper (with 5/6 and 25/30 slot blades), SR250 Gated integrator
- Lock-in Amplifier, Zurich Instruments HF2LI

Basic Equipment

- DC Source meters (5) Agilent B2901A
- Triple DC sources (5) Agilent E3631A
- Oscilloscope, Agilent MOSX3104A 1 GHz
- Arbitrary waveform generator, Agilent 33250A
- Microscope, Nikon SMZ 745
- Assorted tools and cables
- Infrared Laboratories 4.2K bolometer system 15-2000 microns

MASSACHUSETTS LIFE SCIENCES CENTER

A significant portion of core equipment has been purchased through MLSC grant funding support.

TESTIMONIAL

"The modern equipment at the facility enabled me and my company to observe and address a very challenging problem in integrated circuit design. Furthermore, easy access to the building and friendly staff made my visit a very enjoyable experience."

– Dr. A.H. Coskun, Anokiwave