Materials List for:

Characterizing Far-infrared Laser Emissions and the Measurement of Their Frequencies

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Materials

Name	Company	Catalog Number	Comments
Vacuum pump	Leybold	Trivac D4A	HE-175 oil; Quantity = 3
Vacuum pump	Leybold	Trivac D8B or D16B	Fomblin Fluid; Quantity = 1 of each
Vacuum pump	Leybold	Trivac D25B	HE-175 oil; Quantity = 1
Optical chopper with controller	Stanford Research Systems	SR540	
Lock-in amplifier	Stanford Research Systems	SR830	
Spectrum analyzer	Agilent	E4407B	ESA-E Series, 9 kHz to 26.5 GHz Spectrum Analyzer
Amplifier	Miteq	AFS-44	Provides amplification of signals between 2 and 18 GHz. The amplifier is powered by a Hewlett Packard triple output DC power supply, model E3630A.
Amplifier	Avantek	AWL-1200B	Provides amplification of signals less than 1.2 GHz.
Power supply	Hewlett Packard	E3630A	Low voltage DC power supply for amplifier.
Power supply	Glassman	KL Series	High voltage power supply for the CO_2 lasers; Quantity = 2; negative polarity
Power supply	Fluke	412B	High voltage power supply used with the NIST Asymmetric HV Amp
Detector	Judson Infrared Inc	J10D	For fluorescence cell; Quantity = 2
CO_2 laser spectrum analyzer	Optical Engineering	16-A	Currently sold by Macken Instruments Inc.
Thermal imaging plates with UV light	Optical Engineering		Primarily used for aligning the CO_2 reference lasers. Currently sold by Macken Instruments Inc.
Resistors	Ohmite	L225J100K	100 kW, 225 W. Between 4 to 6 resistors are used in each ballast system. Each CO_2 laser has its own ballast system. Fans are used to cool the resistors.
HV relay, SPDT	CII Technologies	H-17	Quantity = 3; one for each CO_2 laser
Amplifier	Princeton Applied Research	PAR 113	Used with fluorescence cell; Quantity = 2
Oscilloscope	Tektronix	2235A	Similar models are also used; Quantity = 2

Oscilloscope/Differential amplifier	Tektronix	7903 oscilloscope with 7A22 differential amplifier	
Power meter with sensor	Coherent	200	For use below 10 W. This is the power meter shown in Figure 2.
Power meter with sensor	Scientech, Inc	Vector S310	For use below 30 W
Multimeter	Fluke	73III	Similar models are also used; Quantity = 3
Data acquisition	National Instruments	NI cDAQ 9174 chassis with NI 9223 input module	Uses LabVIEW software
Simichrome polish	Happich GmbH		Polish for the Nickel base used in the MIM diode detector. Although the Nickel base can be used immediately after polishing, a 12 hour lead time is typically recommended.
Pressure gauge	Wallace and Tiernan	61C-1D-0050	Series 300; for CO_2 laser; Quantity = 3
Pressure gauge with controller	Granville Phillips	Series 375	For far-infrared laser
Zirconium Oxide felt	Zircar Zirconia	ZYF felt	Used as a beam stop
Zirconium Oxide board	Zircar Zirconia	ZYZ-3 board	Used as a beam stop; Quantity = 4
Teflon sheet	Scientific Commodities, Inc	BB96312-1248	1/32 inch thick; used for the far-infrared laser output window
Polypropylene	C-Line sheet protectors	61003	used for the far-infrared laser output window
Vacuum grease	Apiezon		
Power supply	Kepco	NTC 2000	PZT power supply
PZT tube	Morgan Advanced Materials		1 inch length, 1 inch outer diameter, 0.062 inch thickness, reverse polarity (positive voltage on outside); Quantity = 3
ZnSe (AR coated)	II-VI Inc		CO_2 laser window (Quantity = 3), lens, and beam splitter (Quantity 3)
NaCl window	Edmond Optics		Quantity = 1
CaF window	Edmond Optics		Quantity = 2
Laser mirrors and gratings	Hyperfine, Inc		Gold-coated; includes positioning mirrors
Glass laser tubes and reference cells	Allen Scientific Glass		
MIM diode detector	Custom Microwave, Inc		
Other			Other materials include magnetic bases, base plates, base clamps, XYZ translation stage, etc.