Materials List for:

Cryogenic Liquid Jets for High Repetition Rate Discovery Science

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Materials

Name	Company	Catalog Number	Comments
Cryogenic apron	Tempshield	Cryo-apron	Core body protection from cryogenic liquids
Cryogenic face shield	3M	82783-00000	ANSI Z87.1 rated for full face protection from cryogenic liquids
Cryogenic gloves	Tempshield	Cryo-gloves MA	Hand protection from cryogenic liquids
Cryogenic source components	SLAC National Accelerator Laboratory	Custom	Components are made of Oxygen-free Copper (OFC) to maximize thermal conductivity at cryogenic temperatures.
Cryostat and transfer line	Advanced Research Systems	LT-3B	Available in custom lengths up to 1250 mm for compatibility with existing vacuum vessels. Transfer line length and style can be selected based on system or laboratory space constraints.
Cylindrical apertures	SPI Supplies	P2005-AB	Commercial cylindrical apertures can be purchased individually
Electronic-grade isopropanol	Sigma Aldrich	733458-4L	99.999%, minimal particulates/ trace metals, dries residue free
Flammable gas regulator	Matheson	M3816A-350	Pressure control of sample gas (e.g. hydrogen, deuterium)
Indium	Indium Corporation	Custom	99.99%, 50-75μm thick, for thermal and liquid seals in cryogenic source
Jet catcher system	SLAC National Accelerator Laboratory	Custom	Consists of skimmer, vacuum hardware and feedthroughs, vacuum gauge, roots vacuum pump
Laboratory-grade acetone	Sigma Aldrich	179973-4L	Used to remove grease and photoresist from components. Purity and grade not critical since final cleaning will use electronic-grade isopropanol
Leak detector	Matheson	SEQ8067	To ensure jet apertures have sealed before pumping down

Liquid helium	Airgas	HE 100LT	Top-loading dewar, Consumption depends on cryostat, source dimensions, and total gas flow. Typically 3-5 L/h.
Liquid nitrogen	Airgas	NI 160LT22	Total cold trap volume 4 L, consumption approximately 2L/h during jet operation
LN dewar flask (4 L)	ThermoFisher Scientific	4150-4000	For the liquid nitrogen cold trap
LN transfer hose	Cryofab	CFUL series	Uninsulated cryogenic hose with a phase separator to transfer LN from storage dewar to LN dewar flask for the cold trap
Manual XY manipulator	Pfeiffer Vacuum	420MXY100-25	Course adjustment (+/- 12.5 mm) of cryogenic source.
Manual Z manipulator	McAllister Technical Services	ZA12	Course adjustment of cryostat length for interchangeability on different vacuum vessels. Additionally, retracting cryogenic source from interaction point.
Mass flow controller	MKS Instruments	P9B, GM50A	To control and monitor gas flow
Planar apertures	Norcada	Custom	Custom nanofabrication of planar apertures
Positioning actuators	Newport	LTAHLPPV6, 8303-V	High-precision (<2µm), motorized jet positioning
Rotation stage	McAllister Technical Services	DPRF600	Precision alignment of jet orientation
Safety glasses	3M	S1101SGAF	ANSI Z87.1 rated for work with compressed gases