

Materials List for:

Reduced-gravity Environment Hardware Demonstrations of a Prototype Miniaturized Flow Cytometer and Companion Microfluidic Mixing Technology

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Materials

| Name | Company | Catalog Number | Comments |
|---------------------------------|-------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Micro air pump | Smart Products, Inc. | AP-2P02A | Max pressure = 6.76 psi; 1.301" x 0.394" x 0.650", 0.28 oz (8 g); available direct from Smart Products |
| Differential pressure sensor | Honeywell International, Inc. | ASDX015D44R | Range of 0-15 psi; 0.974" x 0.550" x 0.440", 0.09 oz (2.565 g); suppliers include Digi-Key and Mouser Electronics |
| Rigid plastic vial (small size) | Loritz & Associates, Inc. | 55-05 | Polystyrene; ID 0.81" (20.6 mm), IH 2.06" (52.4 mm); available direct from LA Container Inc.; similar product available from Dynalab Corp. |
| latex examination gloves | dynarex corporation | 2337 | Middle finger used for latex diaphragm in fluid source vial. Other brands (e.g., Aurelia ® Vibrant ™) acceptable. |
| Optical glue | Norland Products | NOA 88 | Low outgassing adhesive; available direct from Norland; Also available from Edmund Optics Inc. |
| 3-way solenoid valves | The LEE Company | LHDA0531115H | Gas valves, but can function with liquid; 1.29" L, 0.28" D. Discontinued product. Similar products available from The LEE Company. |
| Volumetric water flowmeter | OMEGA Engineering inc. | FLR-1602A | Non-contacting flow rate meter strongly preferred. We recommend SENSIRION LG16 OEM Liquid Flow Sensor for flow rates from nl/min up to 5 ml/min. |
| PCD-mini photon detector | Sensl | PCDMini-00100 | For fluorescence detection; available direct from Sensl |
| Accelerometer | Crossbow Technology, Inc. | CXL02LF3 | 3-dimensional force detection. Supplied to DMI by NASA. Similar product available from Vernier Software & Technology, LLC. |
| Stereomicroscope | AmScope | SE305R-AZ-E | |
| CCD Camera | Thorlabs | DCU223C | 1,024 x 768 Resolution, Color, USB 2.0; available direct from Thorlabs |

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| USB and Trigger Cable (In/Out) for CCD Camera | Thorlabs | CAB-DCU-T1 | Available direct from Thorlabs |
| Microbore tubing | Saint-Gobain Corporation | AAD04103 | Tygon®; ID 0.02", OD 0.06", 500 ft, 0.02" wall. Suppliers: VWR, Thermo Fisher Scientific Inc. |
| Hollow steel pins | New England Small Tube | (Custom) | 0.025" OD, 0.017" ID, 0.500" L, stainless steel tube, type 304, cut, deburred, passivated; enable microbore tubing connections, chip tubing connections |
| Slide clamp | World Precision Instruments, Inc. | 14042 | Available direct from World Precision Instruments |
| Leur adaptor pieces | World Precision Instruments, Inc. | 14011 | Available direct from World Precision Instruments |
| Silicon wafer | Addison Engineering, Inc. | | 6" diameter; for SU-8 mold fabrication |
| Polydimethylsiloxane (PDMS) elastomer curing agent | Dow Corning | 3097358-1004 | Supplier: Global Industrial SLP, LLC |
| Needle (23 gauge), bevel tip | Terumo Medical Corporation | NN-2338R | Ultra thin wall; 23 G x 1.5"; 22 G also usable; suppliers: Careforde, Inc., Port City Medical |
| Dispensing needle (23 gauge), blunt tip | CML Supply | 901-23-100 | 23 G x 1"; available from CML Supply |
| Cover glass | Thermo Fisher Scientific, Inc. | 12-518-105E | Gold Seal™ noncorrosive borosilicate glass; for PDMS chip cover; 24 x 60 mm; available from Thermo Fisher Scientific, Inc. |
| Vacuum pump | Mountain | MTN8407 | For degassing PDMS; supplier: Ryder System, Inc. |
| Vacuum chamber | Thermo Fisher Scientific, Inc. | 5311-0250 | Nalgene™ Transparent Polycarbonate; available from Thermo Fisher Scientific, Inc. |
| Plasma cleaner | Harrick Plasma | PDC-32G | |
| Hand magnifier | Mitutoyo | 183-131 | Use in reverse direction to enable viewing at ~15". |
| Ethanol | CAROLINA | 861283 | For chip cleaning. Dilute to 70% using millipore water. |
| Water purification system | Thermo Fisher Scientific, Inc. | D11901 | Available direct from Thermo Fisher Scientific, Inc. |
| Optomechanical translation mounts | Thorlabs | K6X | 6-Axis Kinematic Optic Mount; discontinued product; new product (K6XS) available direct from Thorlabs |
| Laptop | Hewlett-Packard | VP209AV | HP Pavilion Laptop running Windows 7 |
| Laptop tray (spring loaded) | National Products, INC. | RAM-234-3 | RAM Tough-Tray™. Can accommodate 10 to 16 inch wide laptops. |
| USB splitter | Connectland Technology Limited | 3401167 | |
| USB Data Acquisition Cards (8 analog input, 12 digital I/O) | National Instruments | NI USB-6008 | 12-Bit, 10 kS/s Low-Cost Multifunction DAQ |
| USB Data Acquisition Cards (16 analog input, 32 digital I/O) | National Instruments | NI USB-6216 | 16-Bit, 400 kS/s Isolated M Series MIO DAQ, Bus-Powered |
| Control/acquisition Software | National Instruments | LabVIEW 2009 | Custom coded National Instruments (NI) LabVIEW |
| 3D Solid Modeling Software | Dassault Systèmes SolidWorks Corp. | SolidWorks 2011 | |

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| 2D Modeling Software | AUTODESK | AutoCAD LT 2008 | |
| Vertical equipment rack | (NASA provided) | N/A | |
| Solid aluminum optical breadboard | Thorlabs | MB2424 | 24" x 24" x 1/2", 1/4"-20 Taps; available direct from Thorlabs |
| Industrial grade steel and hardener | The J-B Weld Company | | J-B Weld Steel Reinforced Epoxy Glue |
| Micro-hematocrit capillary | Fisher Scientific | 22-362-574 | inner diameter 1.1 to 1.2 mm |
| 1 ml syringes | Henke-Sass, Wolf | 4010.200V0 | NORM-JECT®; supplier: Grainger, Inc. |
| Human red blood cells | Innovative Research | IPLA-WB3 | Tested and found negative by supplier for: HBsAg, HCV, HIV-1, HIV-2, HIV-1Ag or HIV 1-NAT, ALT, and syphilis by FDA-Approved Methods. Because no test methods can guarantee with 100% certainty the absence of an infectious agent, human derived products should be handled as suggested in the U.S. Department of Health and Human Services Manual on BIOSAFETY IN MICROBIOLOGICAL AND BIOMEDICAL LABORATORIES, FOR POTENTIALLY INFECTIOUS HUMAN SERUM OR BLOOD SPECIMENS |
| Phosphate buffered saline concentrate | P5493 | SIGMA | 10x; diluted to 1x |
| Tween | P9416 | SIGMA | TWEEN® 20 |
| Centrifuge | LW Scientific | STRAIGHT8-5K | Swing-Out 8-place Centrifuge. Available through authorized dealers. Other centrifuges available direct from LW Scientific. |
| HD video recorder | Sony | MHS-CM5 | |
| Orange fluorescent nucleic acid stain | Invitrogen | S-11364 | SYTO® 83 Orange Fluorescent Nucleic Acid Stain. Stored in DMSO solvent. Always wear recommended Personal Protective Equipment. No special handling advice required. |
| Fluorescent counting beads | Invitrogen | MP 36950 | CountBright™ Absolute Counting Beads. Always wear recommended Personal Protective Equipment. No special handling advice required. |