**Annex 3 - Supply of equipment for the Microfluidics Laboratory – technical specifications**

This technical specifications define the requirements for the supply of equipment for the microfluidic laboratory, including equipment for the production of microfluidic models (PDMS chips) and for the assembly and control of microfluidic fluid circuits. The required delivery includes transportation, installation, commissioning and operator training on each device. Compliance with the required parameters must be demonstrated through technical sheets, measurement protocols, photographs or similar documents to ensure that only tested and working products are offered and not devices that are still in development or in the prototype phase.

The specific required technical parameters are listed in the following table:

|  |  |
| --- | --- |
| 1. Equipment for manufacturing master molds for PDMS chips | The device must enable the production of 2D master molds using negative photoresists. The delivery must contain the following items (1.1 – 1.3) with the minimum parameters according to the specifications below. It must be a complete chain that allows for the traceability of all steps of the entire production process (application of photoresist, thermal stabilization, creation of the mold according to the mask-test mask included in the delivery). |
| * 1. Spin coater | Minimum disk speed: 12000 rpm, including vacuum chuck, wafer positioning device (minimum diameter 100 mm), removable process chamber insert. |
| * 1. Heating plate | Heating plate suitable for the thermal stabilization of the photoresist applied by rotary applicator, temperature: minimum 450 °C. |
| * 1. UV lamp | To activate the photoresist and create the master mold. Wavelength: 365 nm, bandwidth less than 10 nm, adjustable power, minimum 150 W, achievable resolution minimum 3 μm, LED lifetime minimum 5000 hours. |
| * 1. Accessories | Chemicals and tools for testing the production of chip molds in two or more different thicknesses. |
| 1. PDMS chip manufacturing equipment | The equipment must enable the production of 2D PDMS chips using molds created on the device specified in point 1. The delivery must contain the following items (2.1-2.5) with the minimum parameters according to the specifications below. It must be a complete chain that allows for the traceability of all steps of the entire production process (casting the model, cleaning, attaching it to the substrate). |
| * 1. Curing oven | Suitable for curing PDMS. Ability to cure at least 2 chips simultaneously. |
| * 1. Desiccator | Suitable for degassing PDMS after mixing. |
| * 1. Ultrasonic cleaner | Ultrasonic cleaner for cleaning PDMS samples and microscope slides, minimum power: 50 W. |
| * 1. Plasma cleaner | Device for the effective cleaning of PDMS surfaces using plasma technology. Minimum power: 300 W, minimum pressure: 300-1500 mTorr. Chamber dimensions at least 120 mm in diameter. Adjustable power. Including suitable vacuum pump with vacuum regulator. |
| * 1. Accessories | A set of chemicals and tools necessary for testing the manufacture of chips in at least 2 different thicknesses. |
| 1. Direct laser writing system | Maskless lithography system. Exposure area min. 100 x 100 mm, wavelength 375 nm, substrate thickness from 250 m to 10 mm (minimum range), maximum beam size 5 m, maximum repeatability: 10 nm, adjustable laser power, min. laser life 4000 hours, power supply 220-240V |
| * 1. Multi-level alignment system | Additional equipment for the direct laser writing system. A system for measuring samples on a microscope with multi-level alignment for laser maskless lithography. Alignment accuracy: 3 µm. |
| 1. Dry film laminator | Lamination system, designed for the production of microfluidic molds with photoresist, LCD control panel, adjustable temperature up to 140°C, variable speed settings, forward/reverse movement control. |
| * 1. Accessories | Chemicals for making molds, including dry film in various thicknesses and corresponding developers. |
| 1. Microfluidic flow control unit | Control unit for pressure and flow regulation, with 4 channels, operating in different ranges 0/2000 mbar and -900/1000 mbar, including pneumatic filter. Including software interface. The equipment and its accessories must be intended for use in combination with microfluidic chips manufactured using PDMS technology (items 2 and 3). |
| * 1. Compressor | Compressor suitable for the microfluidic flow control unit, maximum noise level 35 dB(A), maximum pressure at least 8 bar. |
| * 1. Vacuum pump | Vacuum pump suitable for the microfluidic flow control unit, maximum noise level 42 dB(A), minimum vacuum 20 mbar. |
| * 1. Flow sensors | 1. Working range 0 to 80 μL/min (aqueous solutions), compatibility with the microfluidic flow controller (item 5), including software interface. 2. Working range 0 to 1000 μL/min (aqueous solutions), compatibility with the microfluidic flow controller, including software interface. 3. Coriolis flow sensor, working range 30 g/h to 30 kg/h, compatibility with the microfluidic flow controller, including software interface. 4. Coriolis flow sensor, working range 1 g/h to 2000 g/h, compatibility with the microfluidic flow controller, including software interface. |
| * 1. Accessories | * Flangeless fittings: PFA nuts for 1/16" tubing with ETFE sleeves (10 pcs). * Barb adapters: 1/4"-28 thread on 3/32" OD barb (10 pcs). * Tubing adapters: Pneumatic cross and T-piece adapters for 6 mm diameter tubes. * Pneumatic hoses: 7mm ID * Control valves: Lever pneumatic control valve (6 mm push-in, 10 bar). * Brass adapters: Plug and socket adapters for connection. * PTFE hose: Replacement roll 1/16" OD x 1/32" ID (min. 50 meters). * Flow resistances: PEEK tubing with various inner diameters for controlled flow - 50 μm, 65 μm, 100 μm, 175 μm, 250 μm (multiple lengths). * Multiplexer distribution system (1 pc), multiplexer recirculation system (1 pc), rack for containers (15 and 50 ml), distributors, flow resistors, air traps thread 1/4"-28, adapters for 1/16" tubing to 1/4"-28 * Flow distributor with minimum 13 ports, 1/4-28 threaded connection for 1/16 OD tubing, including blanking plugs (x10) and PTFE tape for sealing, compatible with the microfluidic flow controller. * Microfluidic tools: Hose cutter |
| 6. Training | * Training for at least 2 people in the operation of all equipment, its maintenance, and safety. The training must include a demonstration of PDMS chip manufacture using the supplied equipment (item 1-4) and a demonstration of the use of PDMS in combination with a control unit for pressure and flow regulation (item 5). |