**UCLA 2P Miniscope Assembly Guide**

Component Inventory and Validations

The first step in assembly is to validate all components are sourced and ready to be used. For the headpiece, it's straightforward to think about breaking the parts down into their respective subassemblies and ensure that all parts are assembled. Please find links to each component either within the GitHub repository or respective manufacturer. Some components, like the electronic PCBs, the custom lenses made by Optics Technology, and diced filters, are custom made or modified and need to be either constructed yourself or with the help of manufacturers. We are hoping to put together batch orders for components such that users can receive all needed parts for fabrication in a single shipment. For more information please contact pgolshani@mednet.ucla.edu

These components are required for the **Main Housing Assembly**:

| **Component** | **Part Number** | **Manufacturer** | **Unit** | **Price** | **Subtotal** | **Link** |
|---|---|---|---|---|---|---|
| Main Housing | Main_Housing.STL | Custom | 1 | $1.00 | $1.00 | Main Housing |
| Lens Cover | Lens_Cover.STL | Custom | 1 | $1.00 | $1.00 | Lens Cover |
| Flex-PCB | FLEX-PCB | Custom | 1 | $600.00 | $600.00 | Flex-PCB |
| Scan Lens | AC050-010-B | ThorLabs | 2 | $51.38 | $102.76 | Scan Lens |
| Tube Lens* | OT-1 (Custom) | Optics Technology | 1 | $1,100.00 | $1,100.00 | Tube Lens |
| 2P Dichroic (Diced) | ZT775sp-2p, 8x8.5x1mm | Chroma | 1 | $540.00 | $540.00 | 2P Dichroic |
| Torx Screws | 96817A704 | McMaster-Carr | 4 | $0.63 | $2.53 | Torx Screws |
| Optical Glue | NOA68 | Norland | 1 | $40.70 | $40.70 | Optical Glue |
| | | | | | **$2,387.99** | |
| * Tube lens is custom fabricated, please contact pgolshani@mednet.ucla.edu for more information | | | | | | |

The following components are required for the **Detector Assembly**:

| **Component** | **Part Number** | **Manufacturer** | **Unit** | **Price** | **Subtotal** | **Link** |
|---|---|---|---|---|---|---|
| Detector Housing | Detector_Housing.STL | Custom | 1 | $1.00 | $1.00 | Detector Housing |
| Emission Filter Support | Emission_Filter_Support.STL | Custom | 1 | $1.00 | $1.00 | Emission Support |
| Collection Lens | 47-895 | Edmund Optics | 1 | $62.50 | $62.50 | Collection Lens |
| Emission Filter (Cut)* | ET750sp, 4mm OD x1mm | Chroma | 2 | $150.00 | $300.00 | Emission Filter |
| 1P Dichroic (Diced)** | T550lpxr, 4x4x1mm | Chroma | 1 | $112.50 | $112.50 | 1P Dichroic |
| SiPM Detector | S13360-3075PE | Hamamatsu | 2 | $52.88 | $105.76 | SiPM Detector |
| | | | | | **$582.76** | |
| * The emission filter used is a modified form of the ET750sp-2p8 (linked) to reduce the thickness | | | | | | |
| ** The cost per filter was reduced in our order due to multiple 4mm filters being produced from one standard filter after dicing | | | | | | |

The following components are required for the **Collimator Assembly**:

| Component | Part Number | Manufacturer | Unit | Price | Subtotal | Link |
|---|---|---|---|---|---|---|
| Collimator Housing | Collimator_Housing.STL | Custom | 1 | $1.00 | $1.00 | Collimator Housing |
| Collimation Asphere | KGA170-B | Newport | 1 | $107.00 | $107.00 | Collimation Asphere |
| ETL | A-25H1 | Varioptic | 1 | $135.00 | $135.00 | ETL |
| Torx Screws | 96817A704 | McMaster-Carr | 4 | $0.63 | $2.53 | Torx Screws |
| | | | | | **$245.53** | |

The following components are required for the **Lower Housing Assembly**:

| Component | Part Number | Manufacturer | Unit | Price | Subtotal | Link |
|---|---|---|---|---|---|---|
| Lower Housing | Lower_Housing.STL | Custom | 1 | 1 | 1 | Lower Housing |
| Objective Lens* | OT-2 (Custom) | Optics Technology | 1 | 4000 | 4000 | Objective Lens |
| O-Ring | | McMaster-Carr | 1 | 0.1596 | 0.1596 | O-Ring |
| | | | | | **$4,001.16** | |
| * Tube lens is custom fabricated, please contact pgolshani@mednet.ucla.edu for more information | | | | | | |

The necessary **tools** for assembling the microscope are:

| Component | Part Number | Manufacturer | Unit | Price | Subtotal | Link |
|---|---|---|---|---|---|---|
| UV-Curing System* | CS20K2 | ThorLabs | 1 | $2,634.66 | $2,634.66 | UV-Curing System |
| Flathead Driver | 84705260150 | Wiha | 1 | $5.17 | $5.17 | Flathead Driver |
| Torx Screwdriver | 52995A24 | McMaster-Carr | 1 | $9.48 | $9.48 | Torx Driver |
| Scan Lens Reamer | 8851A18 | McMaster-Carr | 1 | $24.18 | $24.18 | Scan Lens Reamer |
| Tube Lens Reamer | 8851A21 | McMaster-Carr | 1 | $28.78 | $28.78 | Tube Lens Reamer |
| Ferrule Reamer | 2777A128 | McMaster-Carr | 1 | $116.97 | $116.97 | Ferrule Reamer |
| | | | | | **$2,819.24** | |
| *This is the replacement for what we use in the lab (now obsolete part no. LED-200, ThorLabs) | | | | | | |

Please note that there are also custom interface circuits that are needed to build the complete system. They are covered in another document and are not referenced in this document further since the main purpose is to describe the method for constructing the microscope headpiece itself. Additionally, you will need an appropriate length of cleaved and sealed HC-920 optical fiber. For now, we will assume that the reader has appropriately launched the 2P laser to the HC-920 optical fiber, with sufficient efficiency.