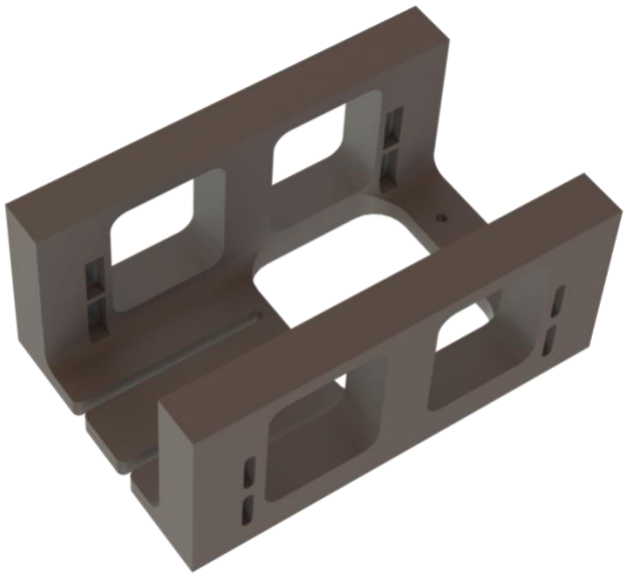
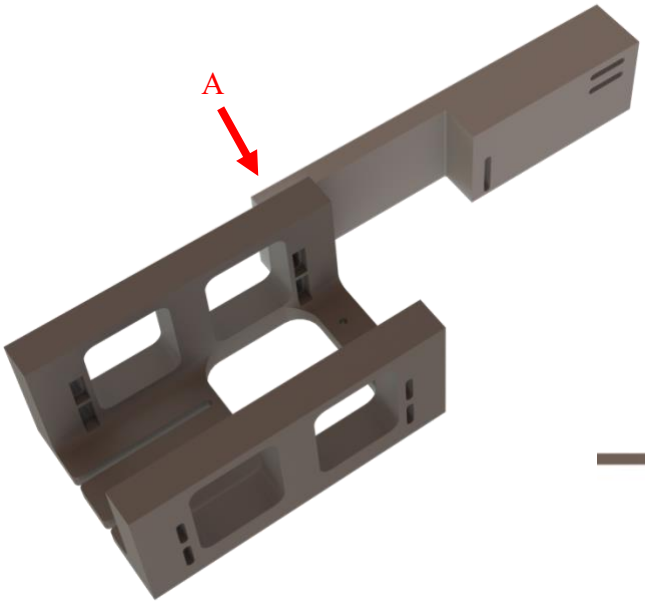
VIEWR: A Visual, InExpensive and Wireless Rheometer (Assembly Instruction)

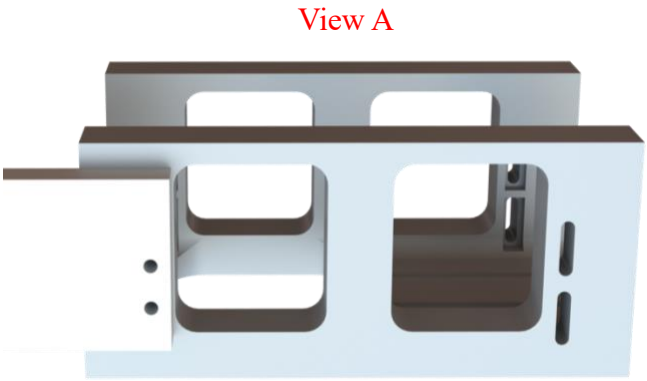
Jianyi Du
Stanford University
September 27, 2023

Step 1: Locate the *base* part (right) with the open section facing up. The bottom is supposed to be mounted on a microscope stage.



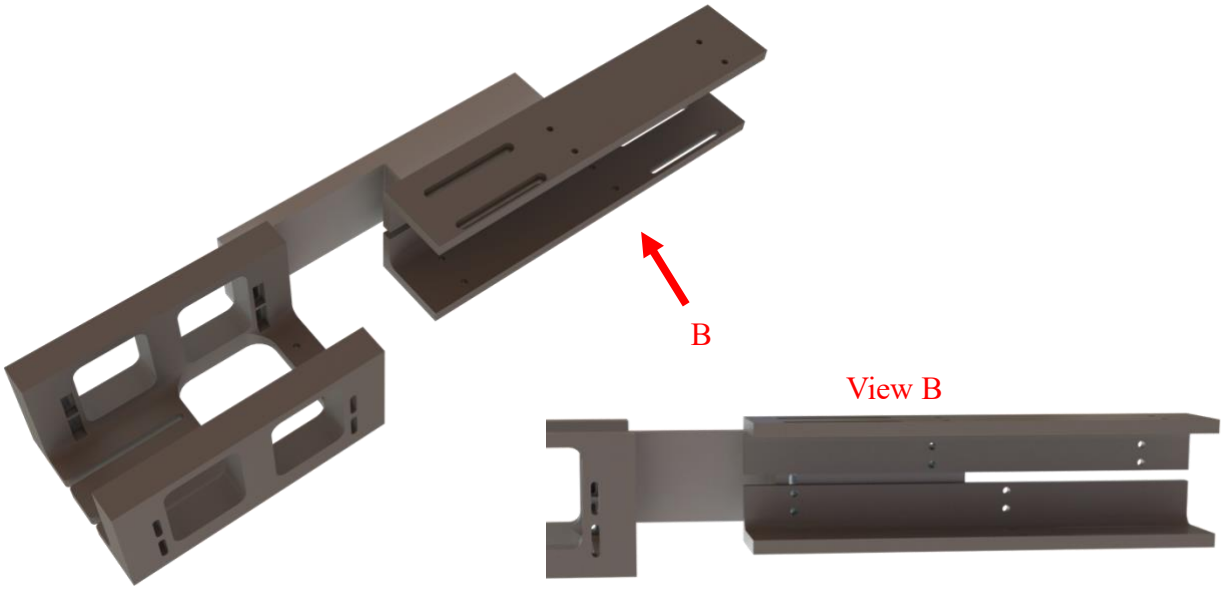


Step 2: Assemble the *connectorBaseSyringe* with the *base* (left). Two screws/square nuts are needed to connect via the side slots (below).

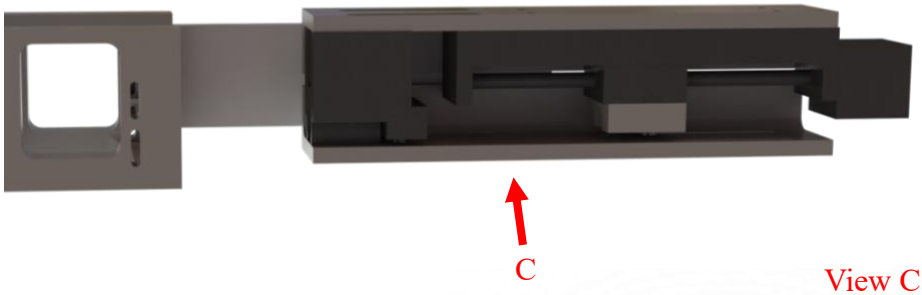


Contact: Jianyi Du (jydu@stanford.edu) | Mark Skylar-Scott (skyscott@stanford.edu).

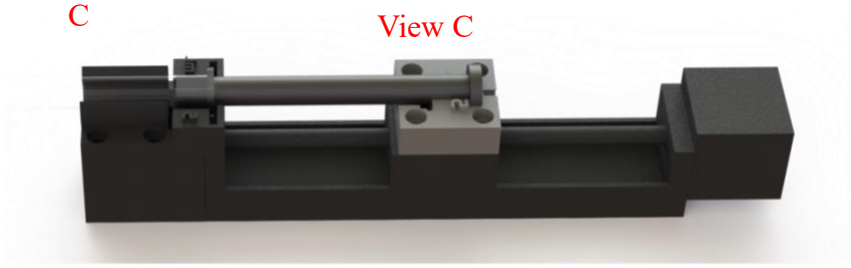
Step 3: Assemble two *pumpBase* parts to the *connectorBaseSyringe* (below). The top one is for installing the syringe pump, and the bottom *pumpBase* is optional, needed only to provide additional support for the syringe.



Step 4: Install the linear rail, *syringeHolder* and *plungerHolder* in order (below). Noted that the syringe is installed upside-down to accommodate the flow channel height with minimal head loss.

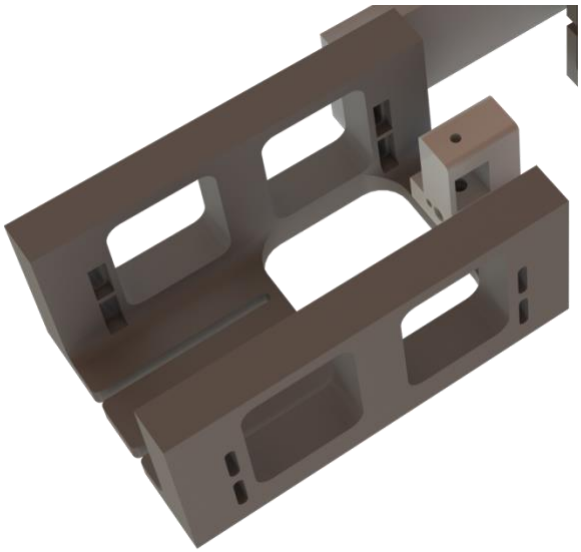


Note: An assembled syringe pump is shown on the right (view C).



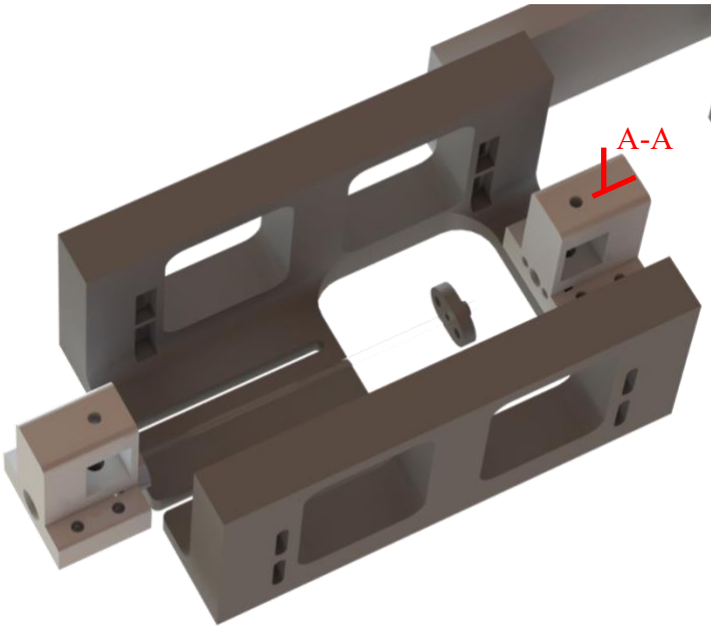
Contact: Jianyi Du (jydu@stanford.edu) | Mark Skylar-Scott (skyscott@stanford.edu).

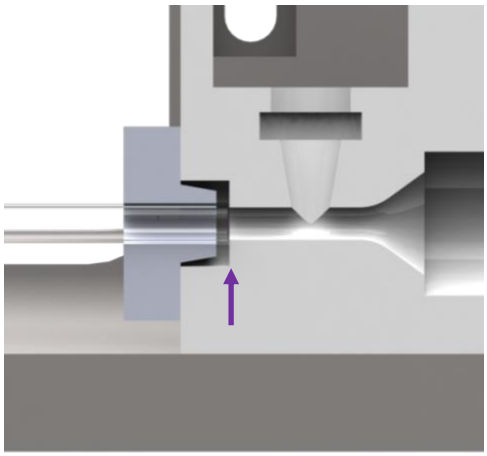
Step 5: Install the inlet tower using the two screw holes on the side. Make sure the screws are not too long to hit the objective when mounted on the microscope stage.



Note:
(1) The CAD files for inlet and outlet towers are essentially identical. However, in the library, two file versions with different predrilled holes are provided (1/4-28, marked "1-4"; M3, marked "M3") for each channel geometry, both of which can house inserts with the corresponding inner threads for direct connection to the syringe or tube adapters.
(2) It is recommended to use larger diameter (1/4) for the inlet, and smaller diameter (M3) for the outlet to induce the desired flow pattern. If using Hamilton syringes, the Gastight versions can be connected directly to the inlets using its 1/4-28 male thread head.

Step 6: Assemble the outlet tower with the glass channel first according to Figure S3a in the manuscript, install the corresponding *channelHolder* (both ends), the O-rings and the necessary screws/nuts (left). Slide the whole assembly into the inlet opening along the track on the *base* and make sure the glass end flushes against the bottom surface of the tower opening (purple arrow in Section A-A).

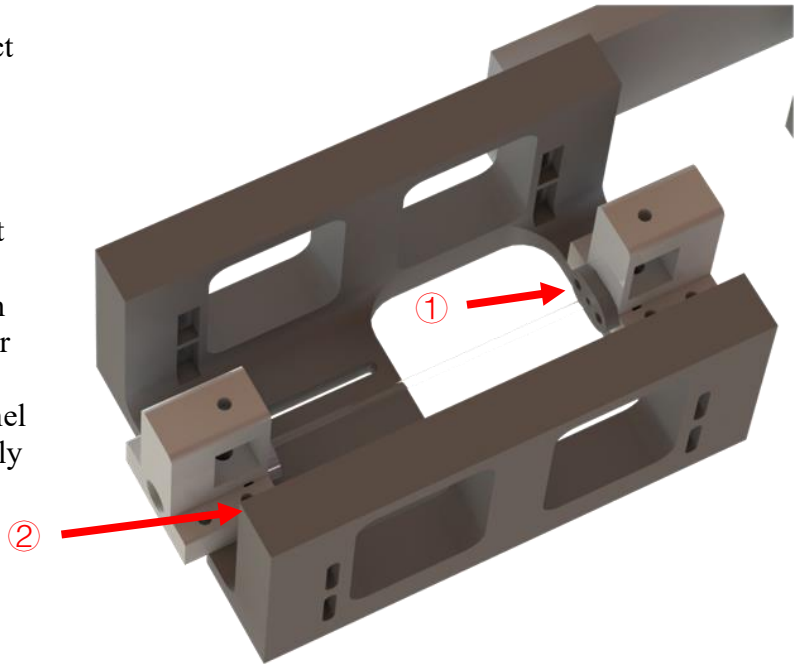




A-A

Contact: Jianyi Du (jydu@stanford.edu) | Mark Skylar-Scott (skyscott@stanford.edu).

Step 7: While slightly pressing the glass channel to ensure good contact between the channel end and the tower opening surface, tighten the screws at location 1 to fix the location. Then push the O-ring between the glass tube into the inlet channel opening to center-align the channel. Then tighten the screws on the *channelHolder* to the inlet tower (location 2) to fix the channel onto the inlet tower. Check if both channel ends are properly sealed by manually pushing a small water/PBS flow.



Contact: Jianyi Du (jydu@stanford.edu) | Mark Skylar-Scott (skyscott@stanford.edu).