

Supplementary Material 1: Description of the filament extruder

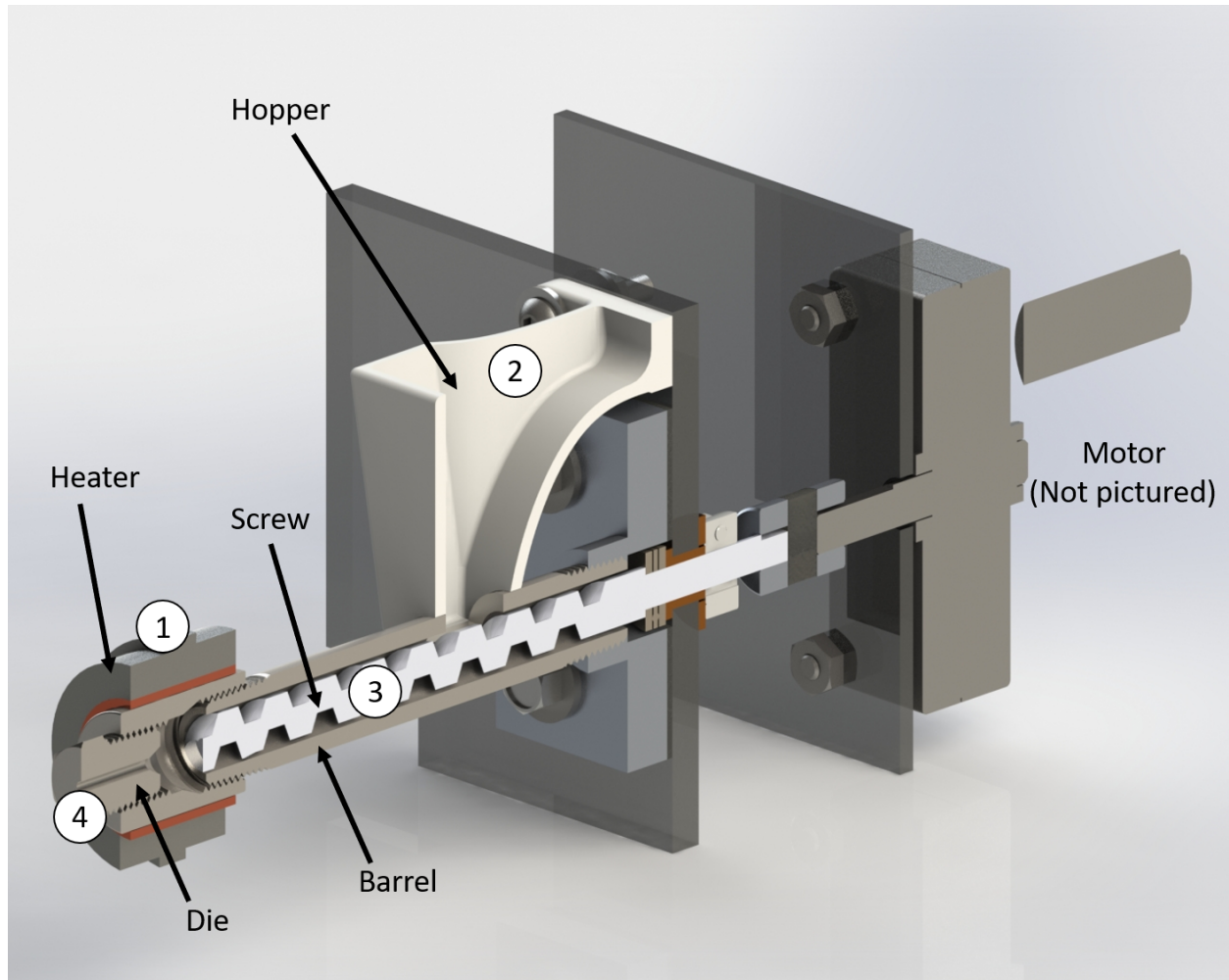


FIG. S1: Schematic of the filament extruder.

Process description:

1. A heater surrounding the die heats it to a pre-selected constant temperature.
2. Polymer/composite polymer pellets are fed into the barrel here through a hopper after the die is at its selected temperature.
3. The screw rotates, carrying pellets to the die, which conducts heat down the metal barrel, partially melting the pellets prior to final melting in the die.

4. The extrusion chamber fills with melted polymer pellets, until it is forcibly extruded out through the die nozzle.

Experiment Specifications

Screw Speed: 16 RPM

Die Temperature: 90°C

Die Diameter: 2.54 mm

Heating Zones: 1 (Surrounding the die)

Motor Voltage: 24V

Screw diameter: 9.00mm

Barrel Inner Diameter: 11.29 mm

Barrel Outer Diameter: 17.20 mm