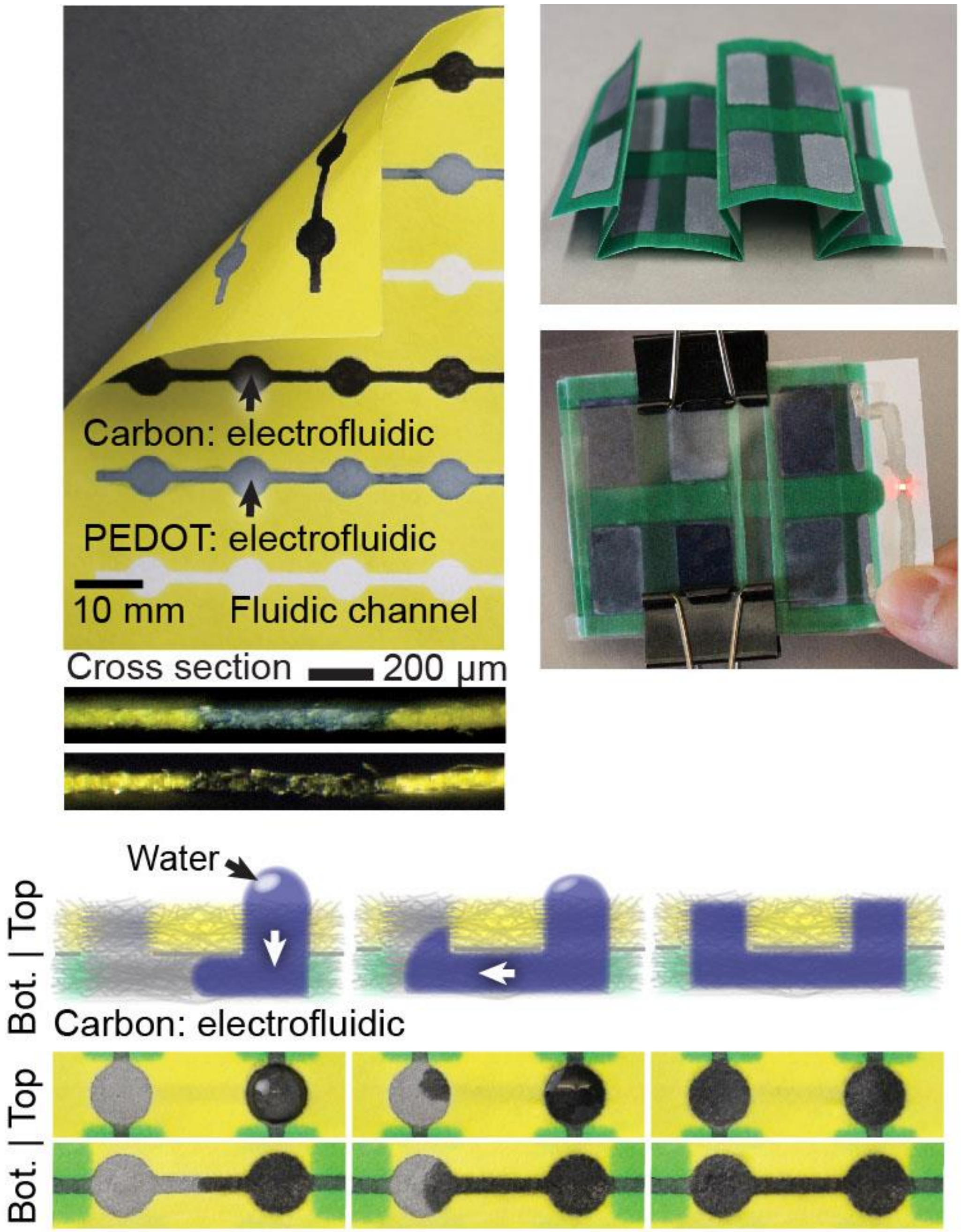

Figure 1. Co-fabrication of paper microfluidic and electronic, (top left) photos of patterned electronic and fluidic structures from the top and the intersection of paper. Here yellow is wax, white is paper, black is conducting carbon multiwall nanotubes, and blue is a conducting polymer. (bottom) shows schematics and time lapse photos of a two-layer device where a liquids wicks through the conducting carbon structure. (Top right) shows photos of paper battery that is designed using PEDOT electrofluidic structures in combination with fluidic structures and conductors. The battery is assembled by folding the paper.

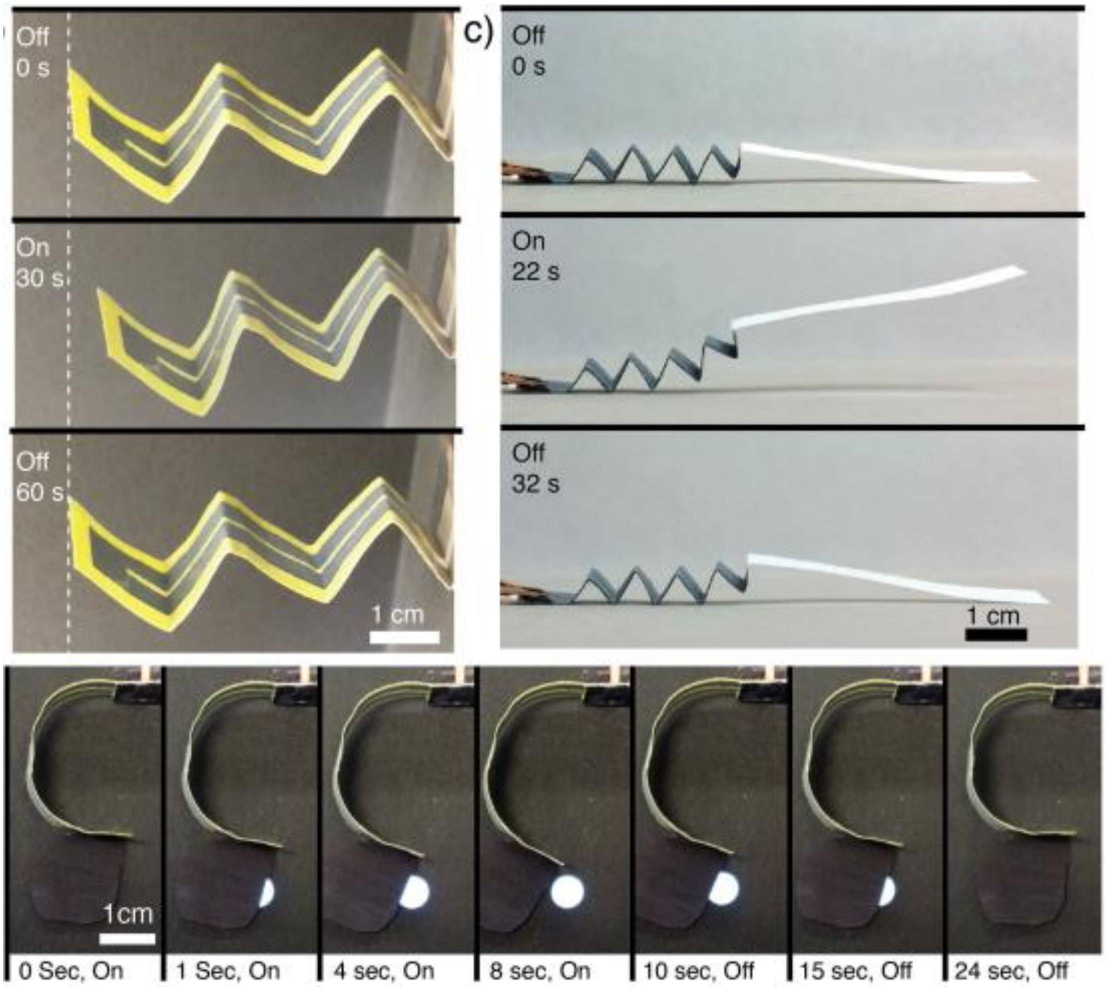

Figure 2. Time lapse photographs of: (Top) Folded paper actuators. (Bottom) An optical shutter based on a curved actuator.

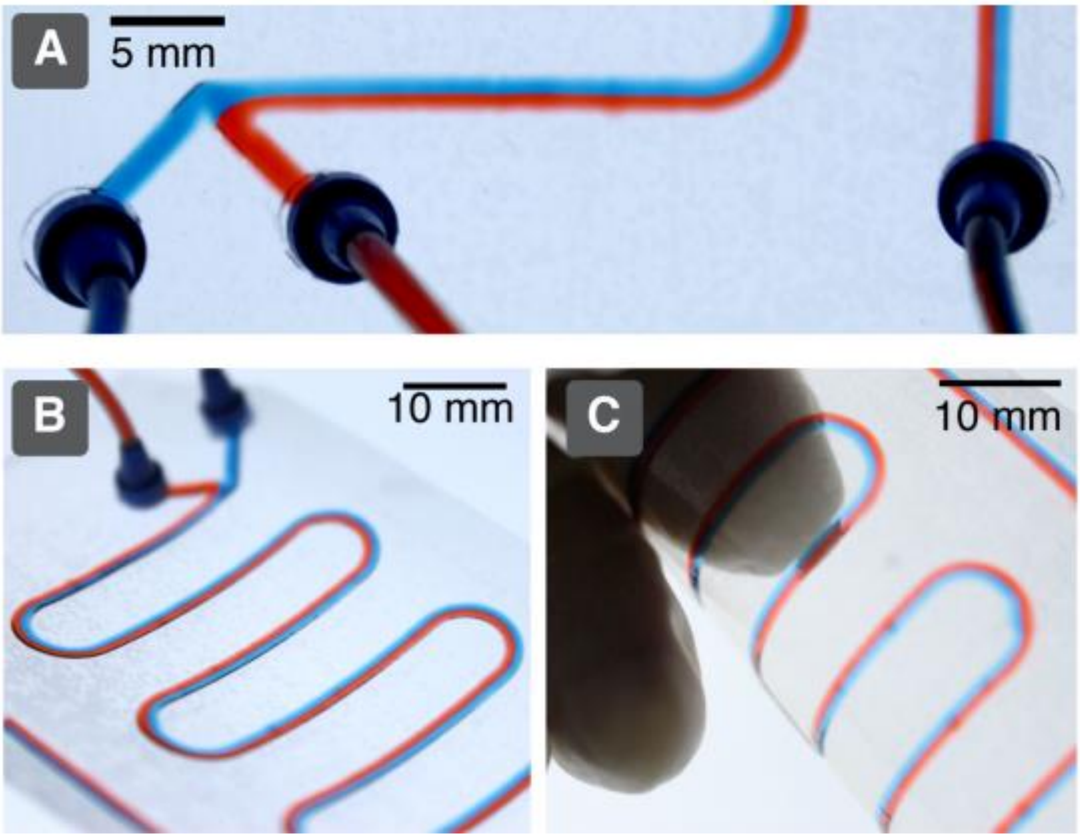

Figure 3. An all-cellophane microfluidic device. The red and blue colors are dyes in water, and flow at 100uL/min in laminar flow.

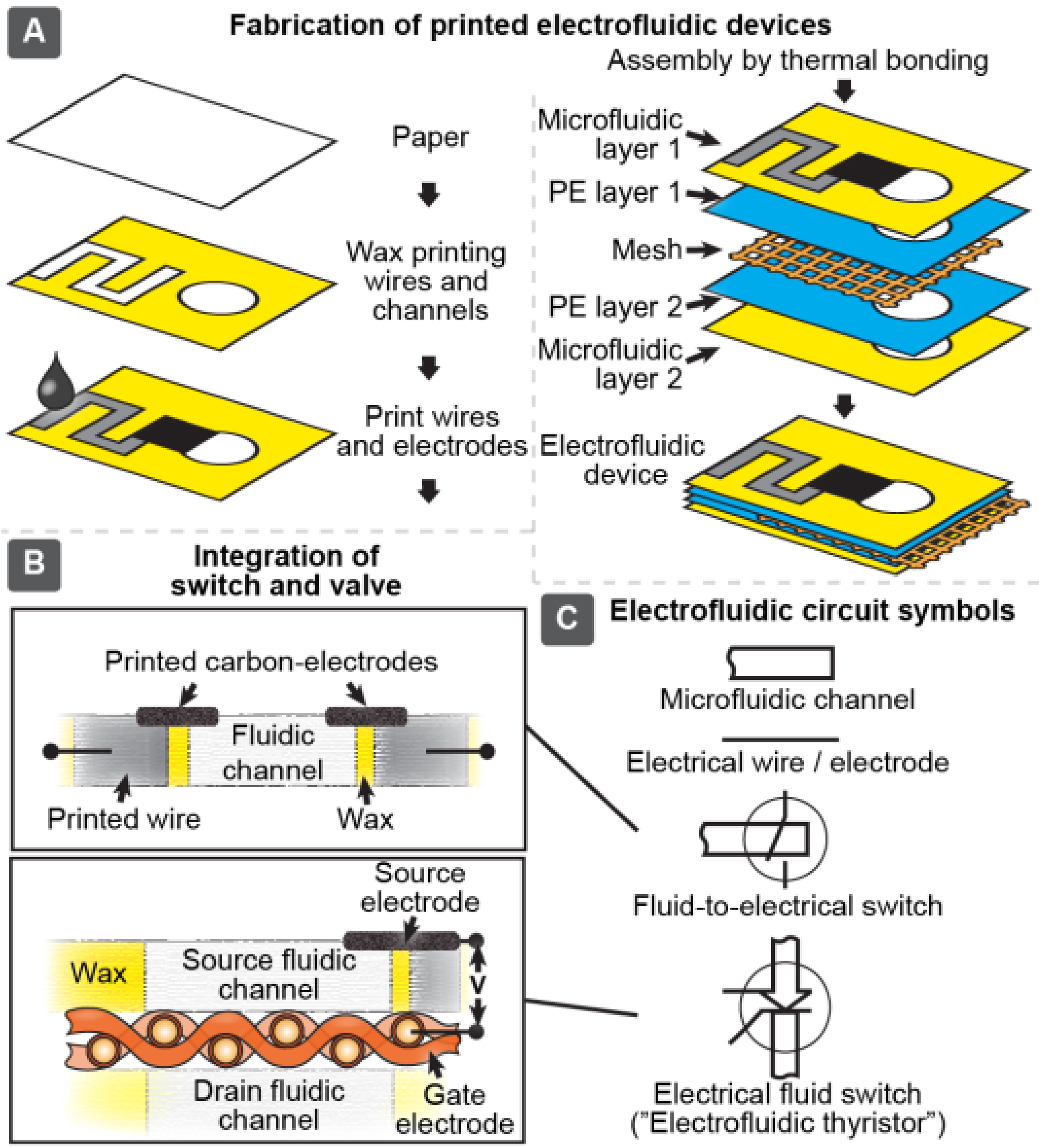

Figure 4. *Design and fabrication of printed electrofluidic devices.* (A) Schematic diagram of the fabrication of three-dimensional printed electrofluidic circuits. Microfluidic channels are printed using wax printing, followed by printing of electrodes (for valves and switches) and electrical wires on the paper layers. Conductive, insulated, and hydrophobic "electrotextiles" are then bonded with the paper layers using hot-lamination with polyethylene films. (B) Schematic cross-section of a fluid-to-electrical switch, and Schematic cross-section of an integrated valve, containing two microfluidic layers, and a valve layer. The valve is actuated when a voltage is applied between the liquid ("source electrode") and the electrotextile ("gate electrode") whereupon liquid can pass from the "liquid source" into the "liquid drain". (C) Circuit diagram symbols for printed microfluidic channels, printed wires/electrodes, integrated fluid-electrical switches, and valves ("electrofluidic thyristors").