

Supplementary Information

Miniaturized system for isotachopheresis assays

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We here present further details about the sub-components of the hand-held instrument (Fig. 1b in the main paper).

Printed circuit board description

We here describe in detail the components within the printed circuit board (PCB) which is housed inside the metal casing (Fig. 1b of the main paper). The PCB consists of all the necessary electronic components for high voltage (HV) generation and switching, optical detection (except the laser diode) and communication with the external interfaced laptop computer.

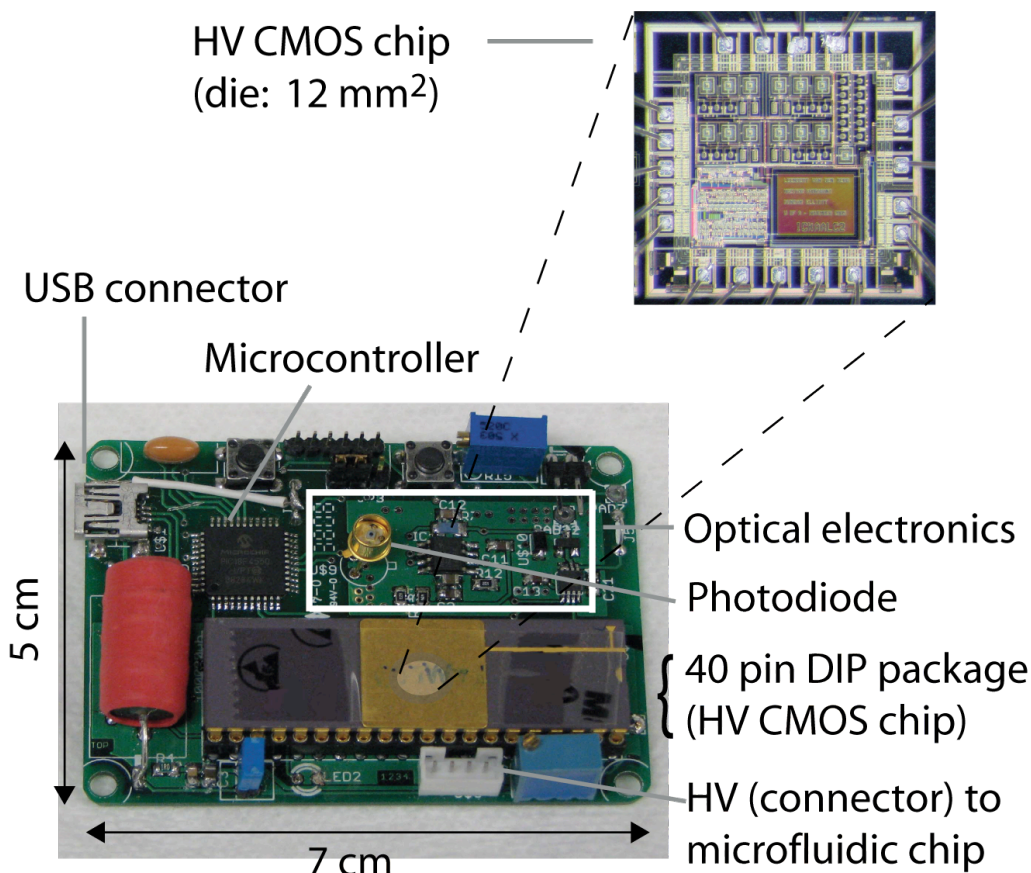


Figure S1: The main components of this printed circuit board are the high voltage module and the optics module. The former consists of a microelectronic chip (or HV CMOS chip; in the inset, a representative micrograph of the HV-CMOS chip we designed is included), an inductor, a capacitor and a diode. The latter consists of a photodiode, a transimpedance amplifier circuit and a compact laser diode (not shown). The low power microcontroller on the PCB locally controls all resident components and derives power via the USB link from the interfaced computer. 5V from the USB link serves as the input to the HV CMOS chip which in turn generates the high voltage to perform isotachopheresis. Further details about the HV CMOS chip can be found elsewhere [Ref. 15 of the main paper]. Presently, the PCB is in prototype phase, consisting of several components with relatively large footprint to allow easier testing and debugging (e.g. potentiometer, connectors and test points). In the future, we can shrink the PCB by ~50% of its size by eliminating test components and using small footprint components.