Ion Liquid Chromatography On-a-Chip for Multiple Ion Sensing

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Abstract

We have developed an integrated ion liquid chromatography chip, which is integrated with column, frits/filters, injector and conductivity detector. On-chip separation and detection of anions in water (~25ppm) have been successfully demonstrated. The detection limit is estimated to be 1ppm for the common anions. A much-improved 2nd-genaration chip is currently being developed to do better injection, separation, and detection. A palm-sized wireless LC system based on the LC chip is also actively being developed.

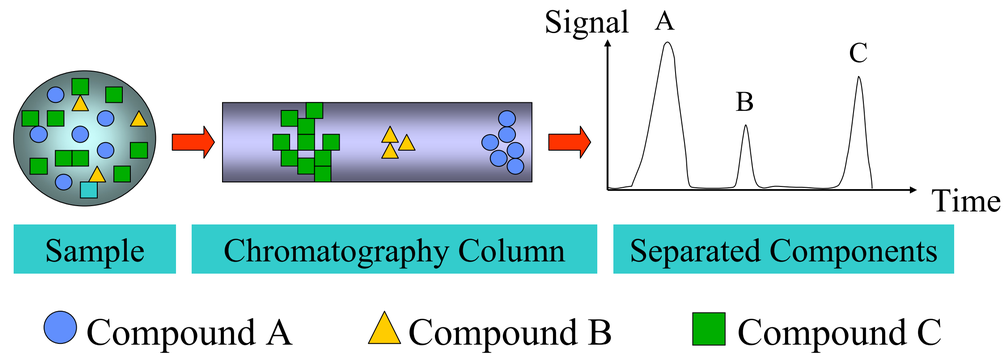


Figure 1. Chromatography Principle

Design, Fabrication, and Performance of the Ion Liquid Chromatography Chip

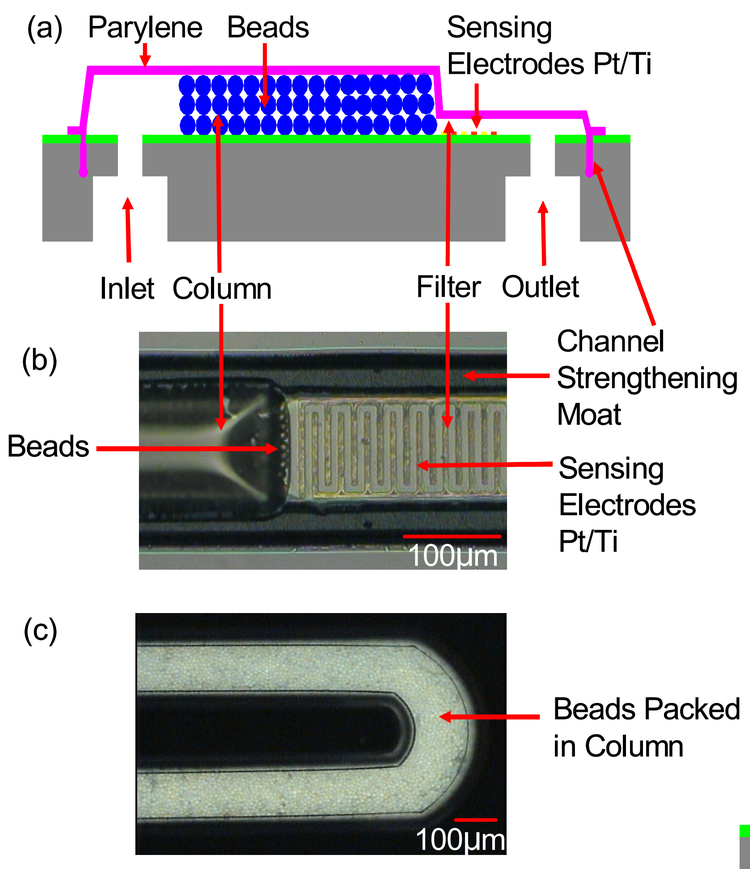


Figure 2. Illustration and pictures of the 1st-generation integrated LC system on-a-chip. (a) Cross-sectional view of the device after fabrication. (b) Beads packed at the filter and sensor. (c) Fluorescent picture of the heavily packed beads in separation column.

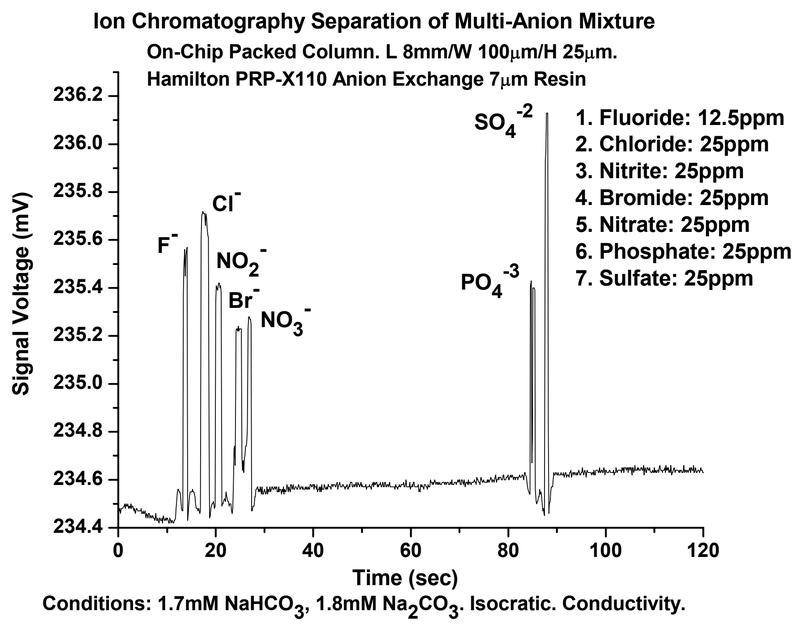
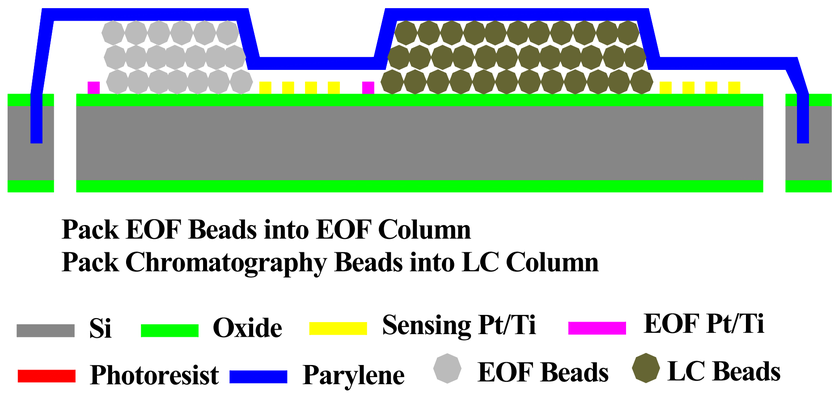


Figure 3. On-chip multi-anion separation result.



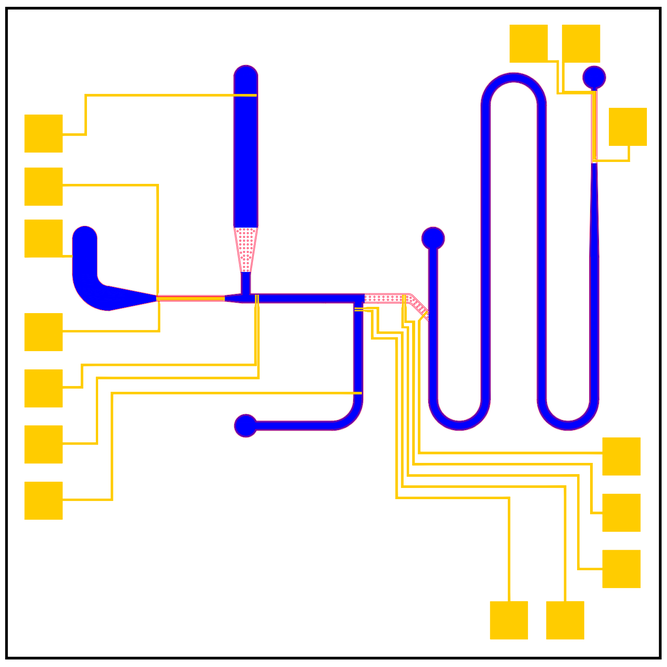


Figure 4. 2nd-Generation LC Chip with EOF pumping, background electronic suppression, and injection monitoring.

Figure 5. Cross sectional illustration for the 2nd generation LC chip with EOF pumping or tandem liquid chromatography column for multi-dimensional separation.

Higher Performance Chip and Wireless LC System On-a-Palm

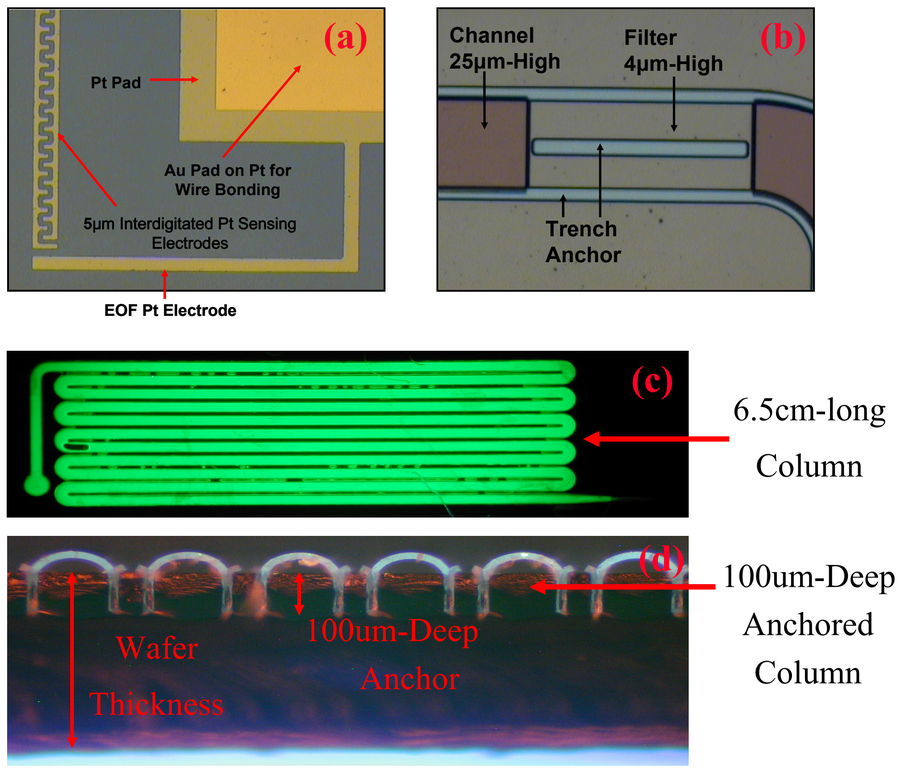


Figure 5. Fabricated device pictures for the 2nd-generation LC chip.

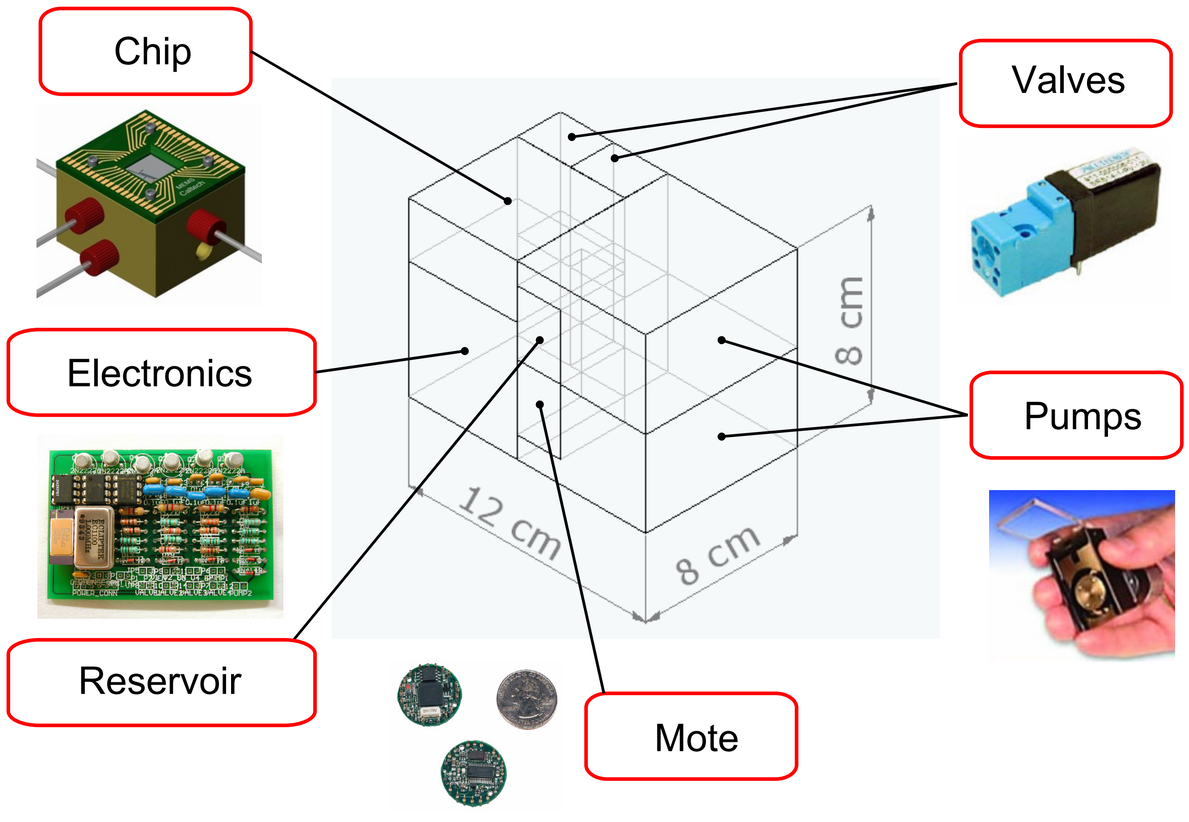


Figure 6. Wireless LC System On-a-Palm