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**Authors**

Chi-Yuan Shih

Qing He

Jun Xie

et al.

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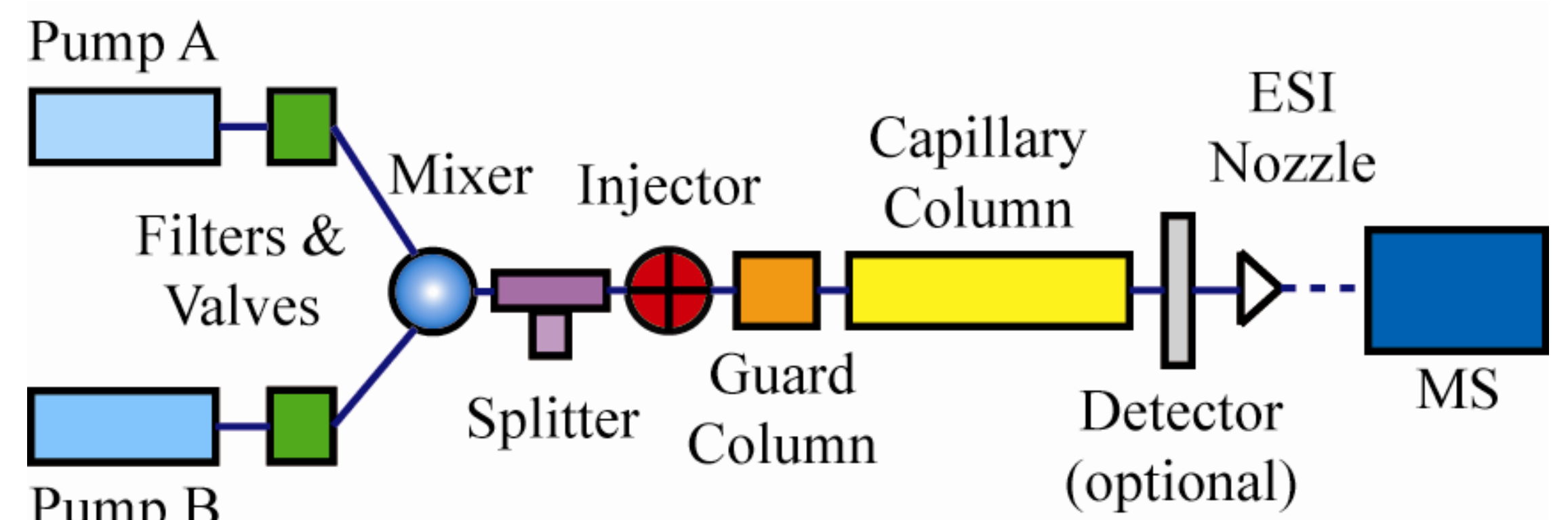
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## Parylene Microfluidic Channel and Plumbing Technology

Chi-Yuan Shih, Qing He, Jun Xie, Jason Shih and Yu-Chong Tai  
 Caltech Micromachining Lab – <http://mems.caltech.edu>

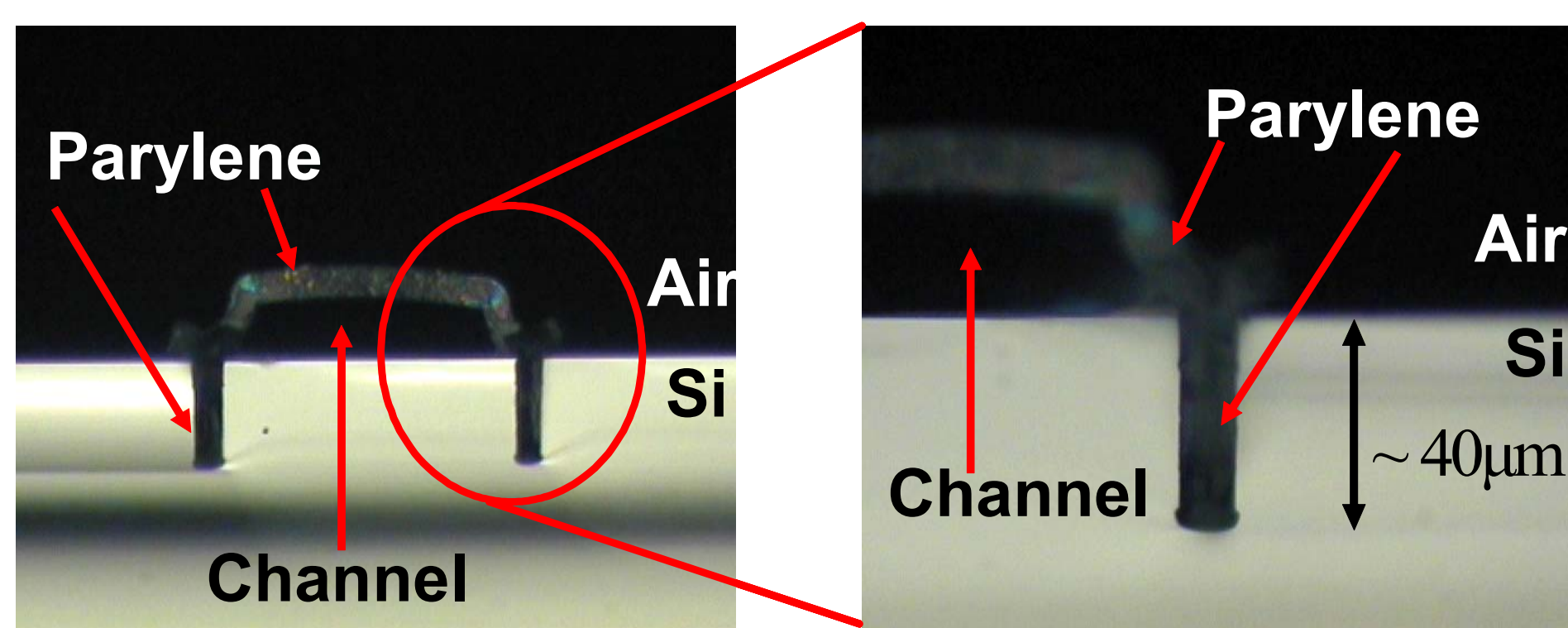
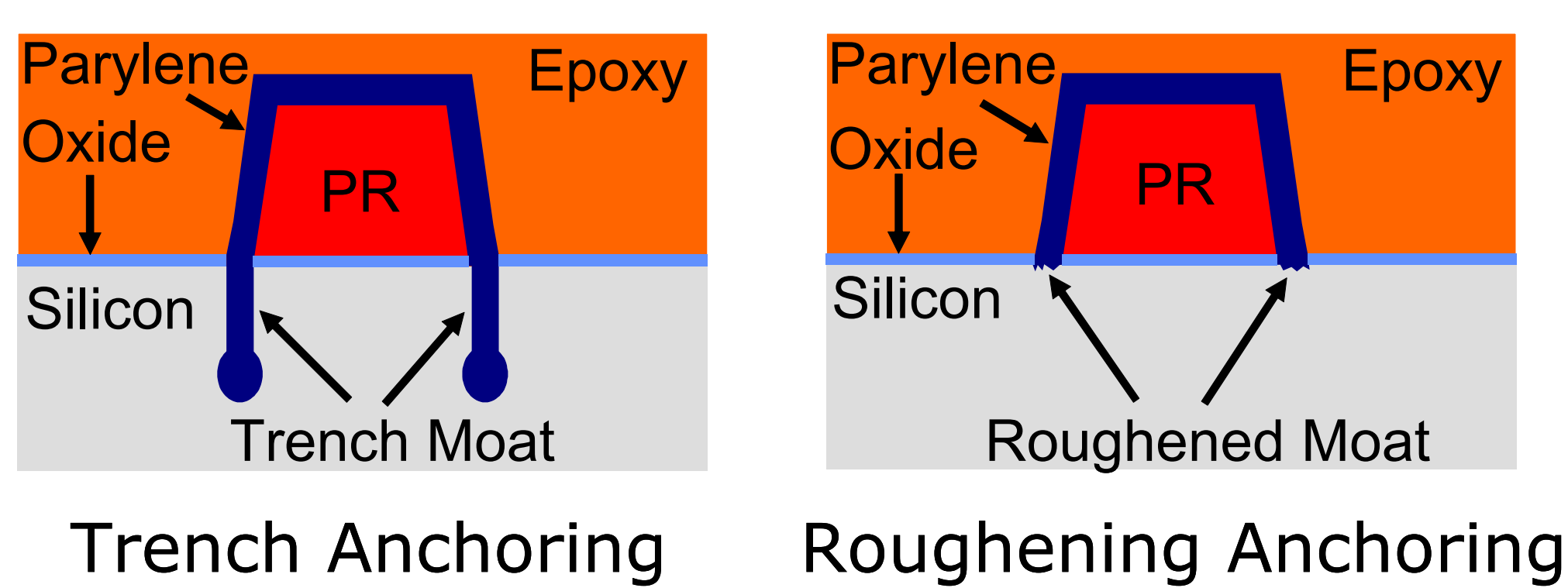
### Abstract

It is desirable that in analytical microfluidic systems such as chip-based liquid chromatography that fluidic channel structure is robust enough so to avoid channel fracture at high pressure operation. In addition, the system fluidic dead volume should be minimized so to enhance analysis quality or shorten the analysis time. We demonstrate here using parylene thin film technology to fabricate channel configurations which provide pressure capacity above 1000 psi. Also, practical solutions for chip packaging and fluidic coupling to off-chip world that guarantee leak-free interface and minimal system dead volume are provided.

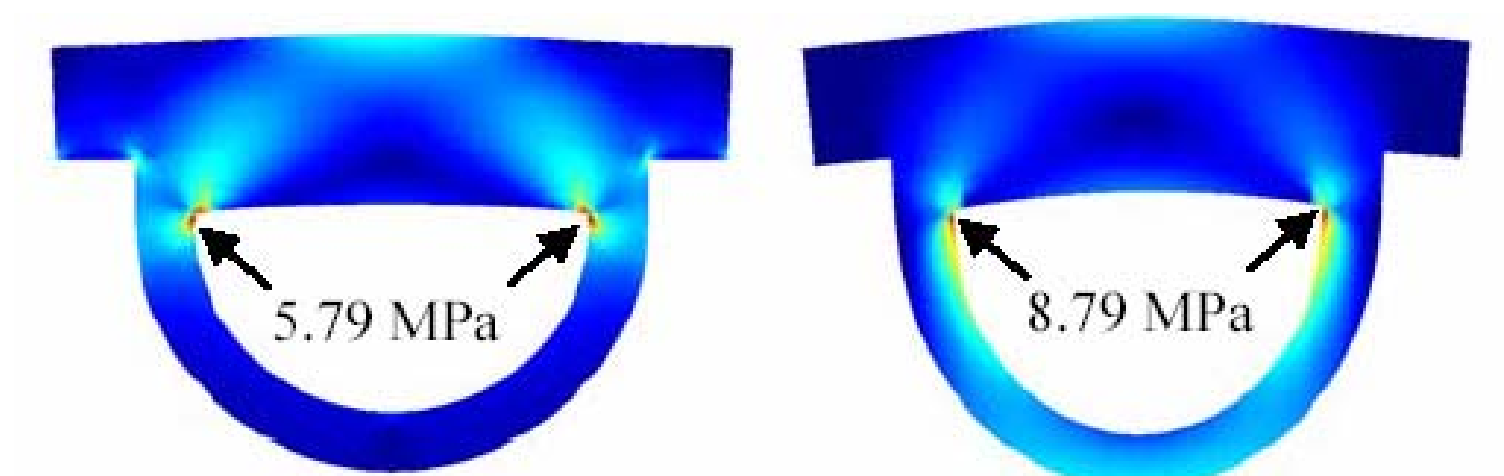
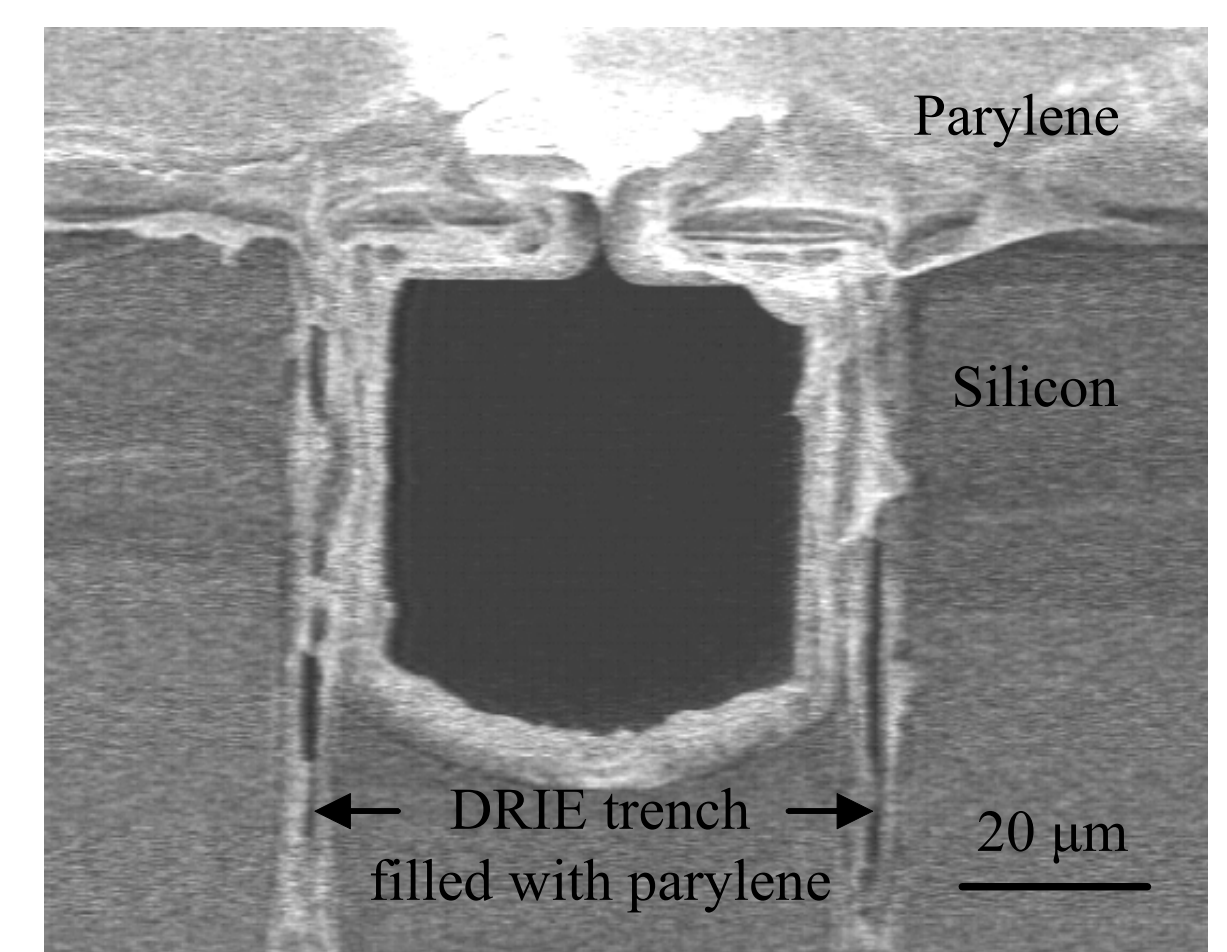
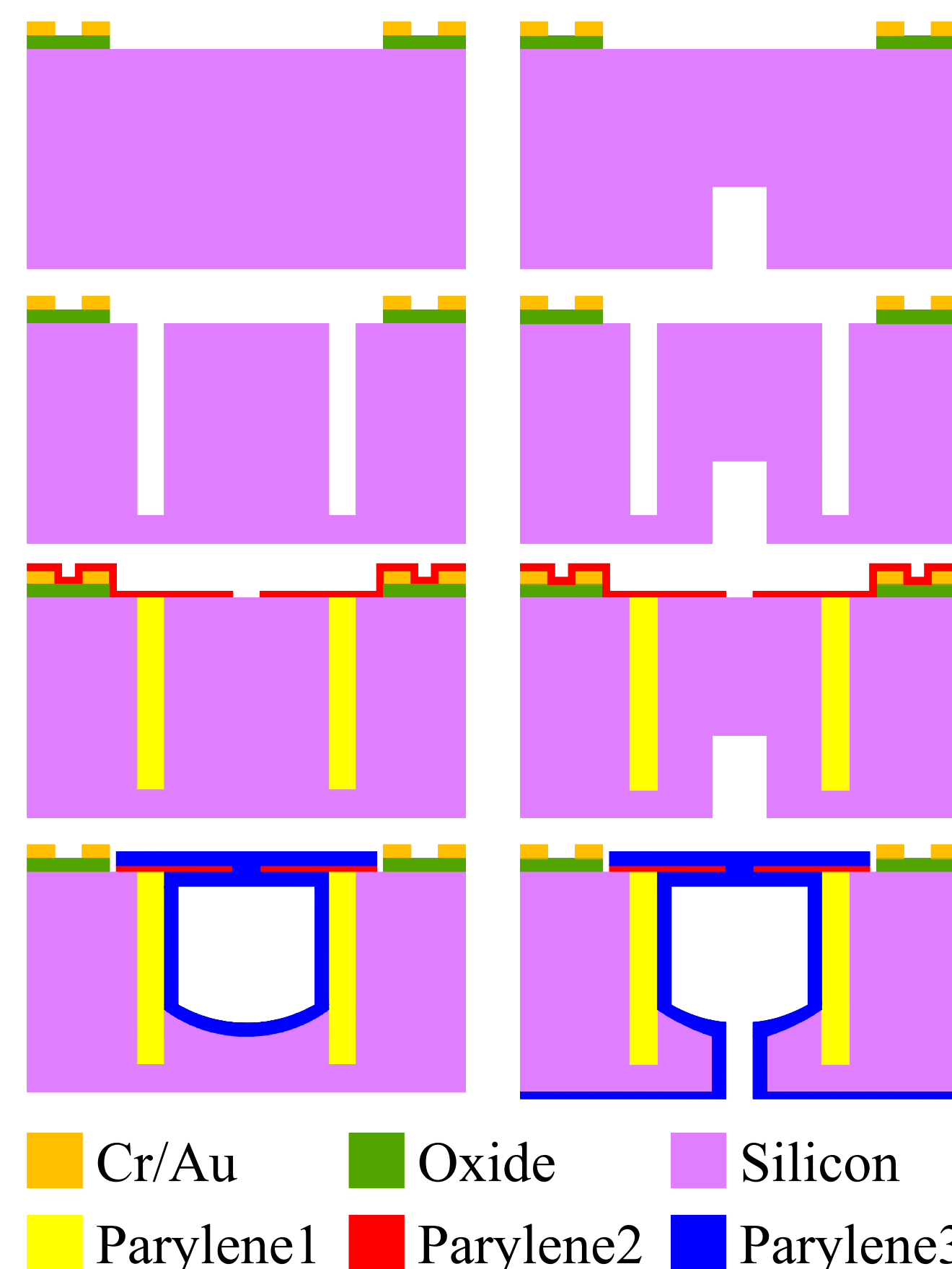


A complete gradient-LC-ESI system showing various microfluidic components and connections in between.

### High Pressure Capacity Parylene Microfluidic Channel Technology



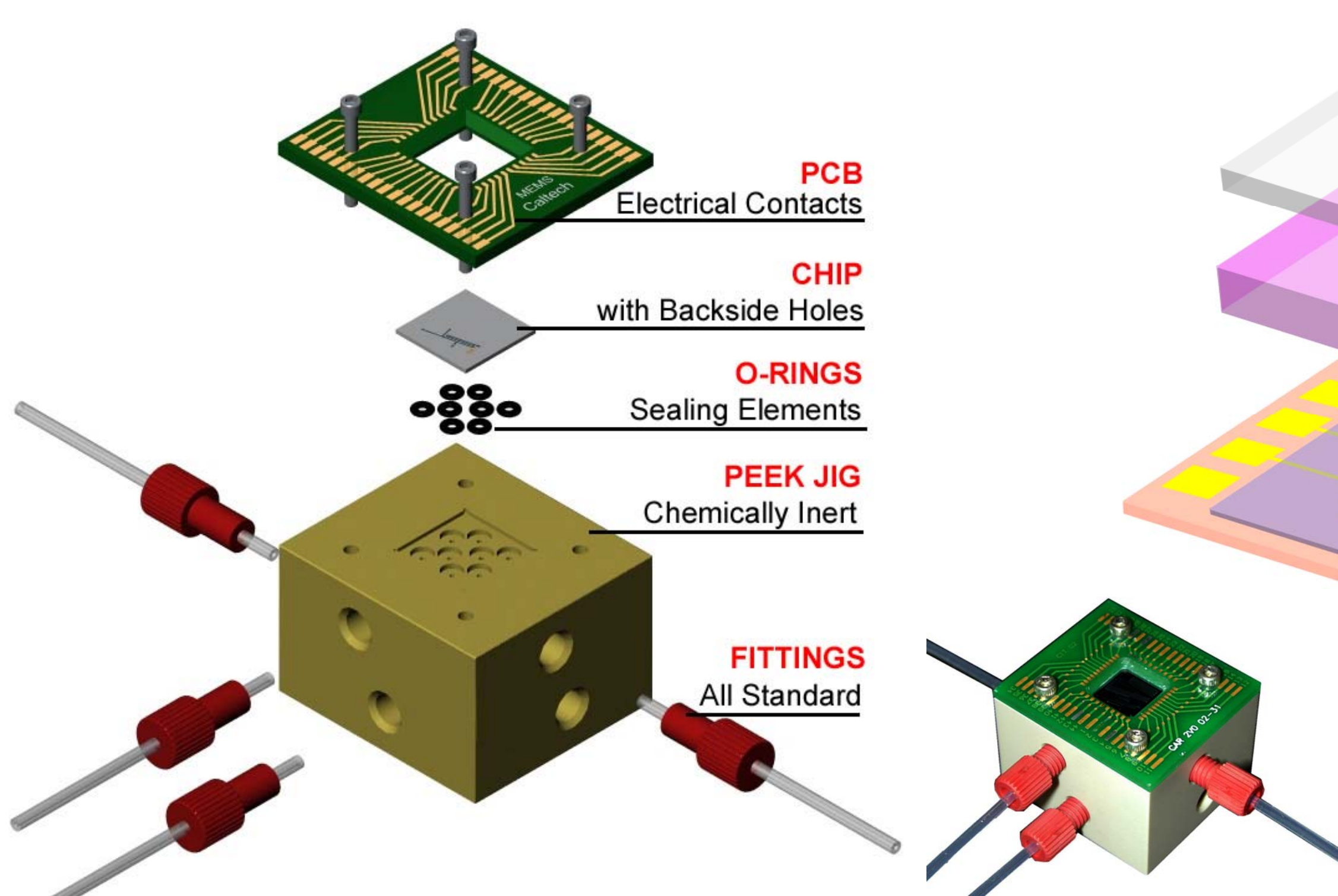
Anchored-type parylene channel. Parylene channel can be anchored down to silicon substrate with either silicon trenches or roughened silicon surfaces. Channel pressure capacity up to 600 psi can be achieved.



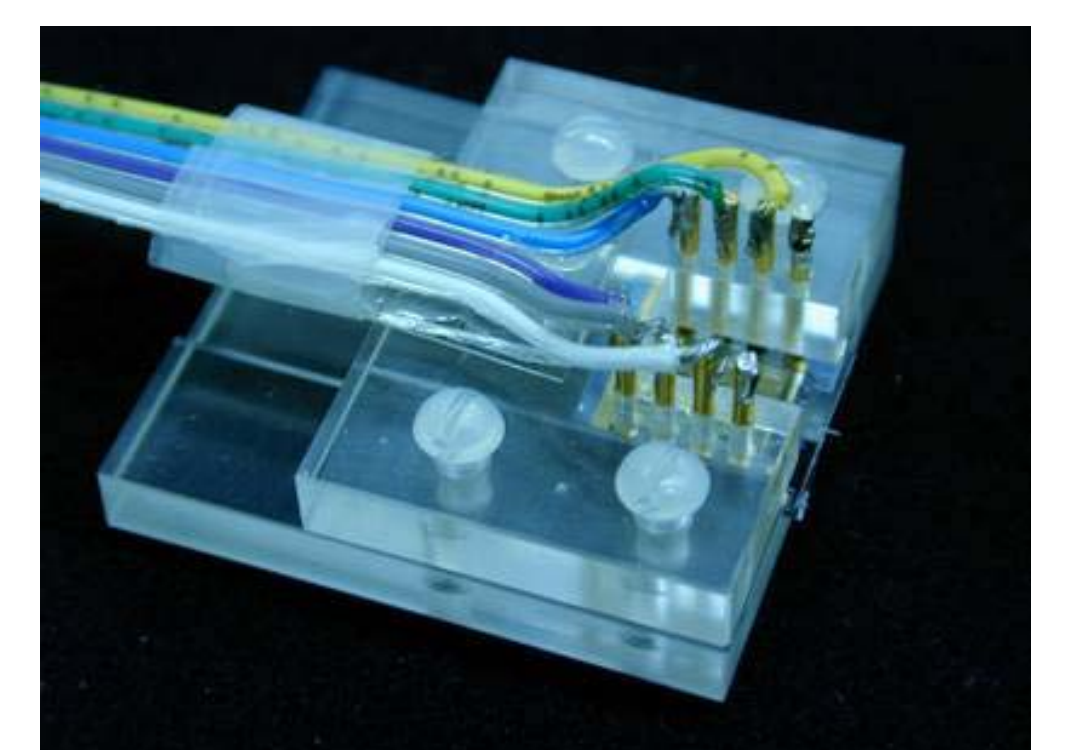
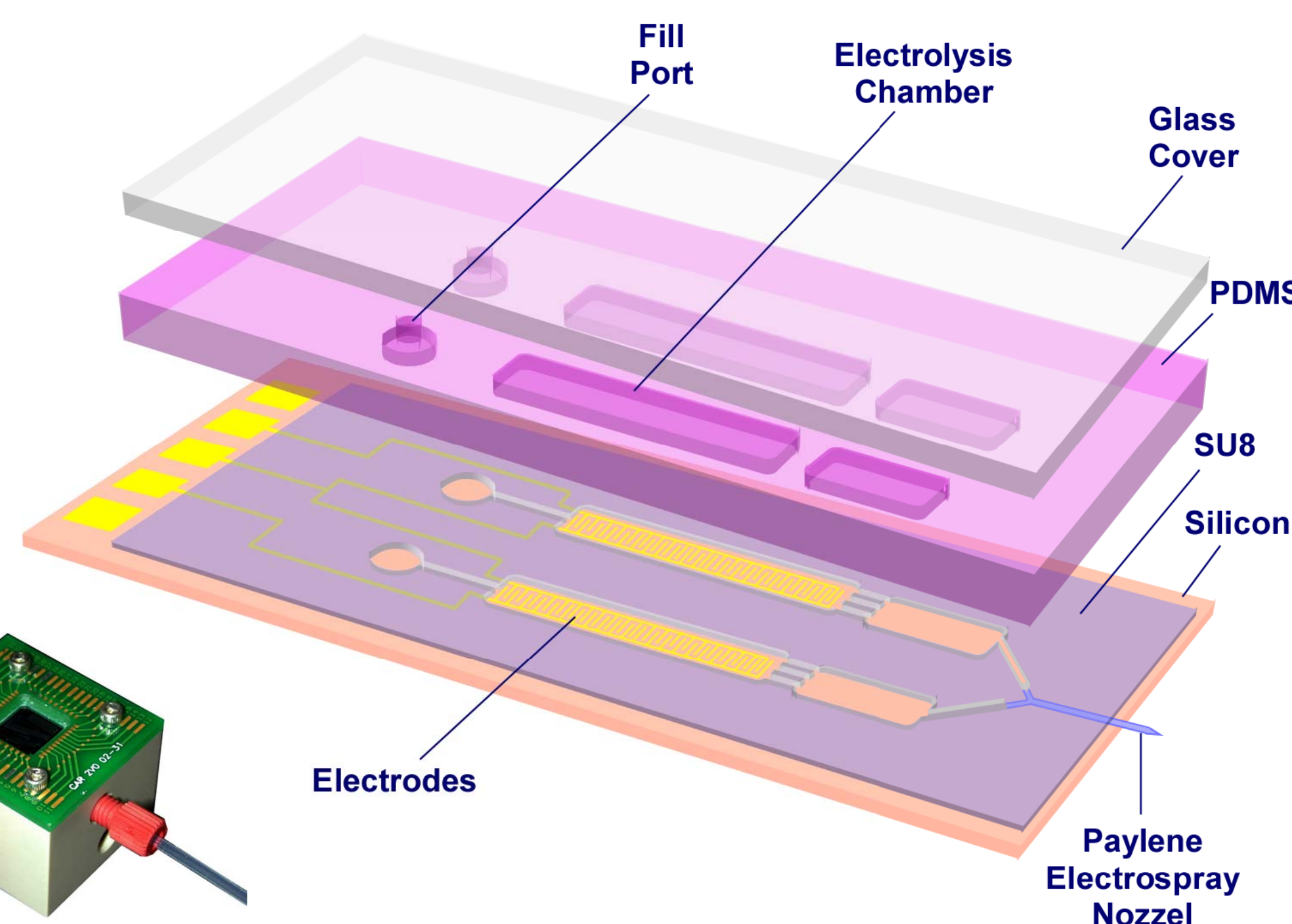
Embedded channel boundary condition reduces maximum stress in parylene by 34% under 100 psi inner pressure loading.

Embedded-type parylene channel. No photoresist sacrificial layer is required for channel cross-section definition. Square-like channel cross-section is achievable. Channel pressure capacity of 1000 psi has been achieved.

### Microfluidic Packaging/Plumbing Technology



Chip packaging with fluidic access to the chip from back side and electrical access to the chip from front side. O-rings provide gas-tight sealing between chip and jig interface.



Chip packaging with on-chip reservoirs to store solutions and on-chip pumps for liquid delivery. System pressure capacity is enhanced by glass plate clamping. Spring probes provide reliable electrical contact to chip front side.