

Micropump

Group 8

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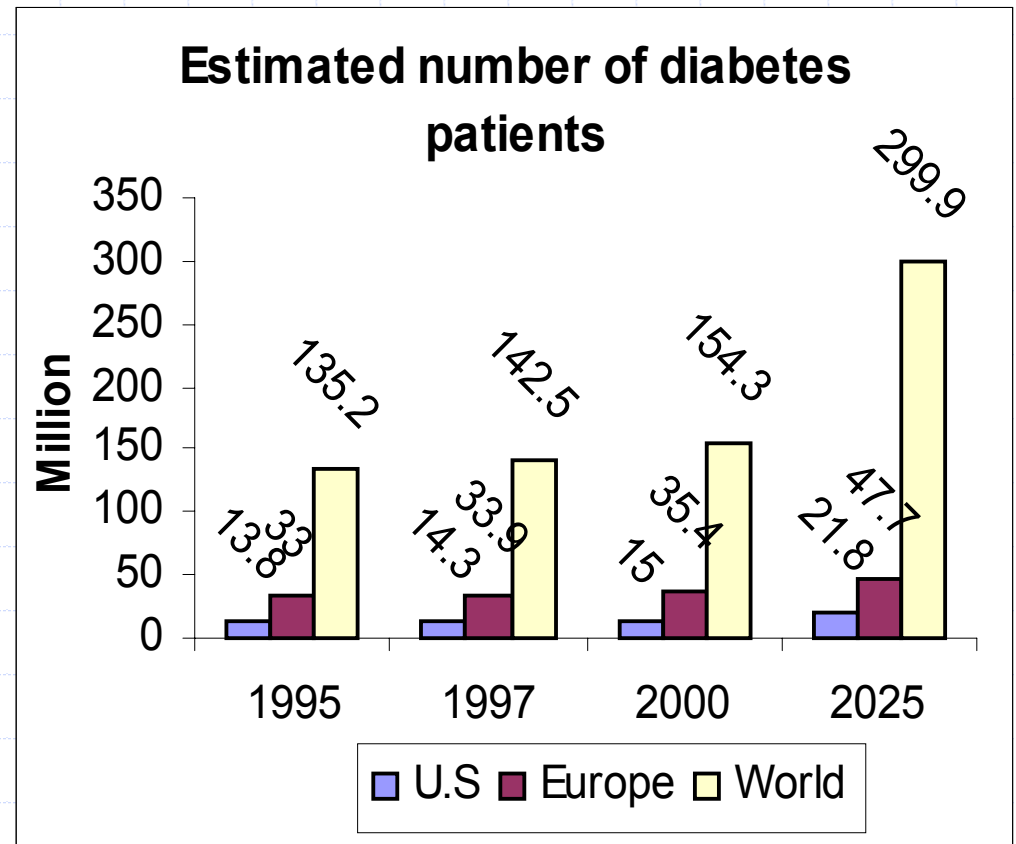
Dongmin Wu

Dolores Cruz

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Market

- ◆ Drug delivery
 - Diabetes
 - IV fluids
 - Chemotherapy
 - Pain killers



Requirements

- ◆ 20–50 ml/day -> 34 $\mu\text{l}/\text{min}$ -> 0.5 $\mu\text{l}/\text{sec}$
- ◆ Chemically inert (insulin)
- ◆ Low power
- ◆ Reliable
- ◆ Cheap

Existing Technology

◆ Mechanical vs. Non-Mechanical

Thermopneumatic

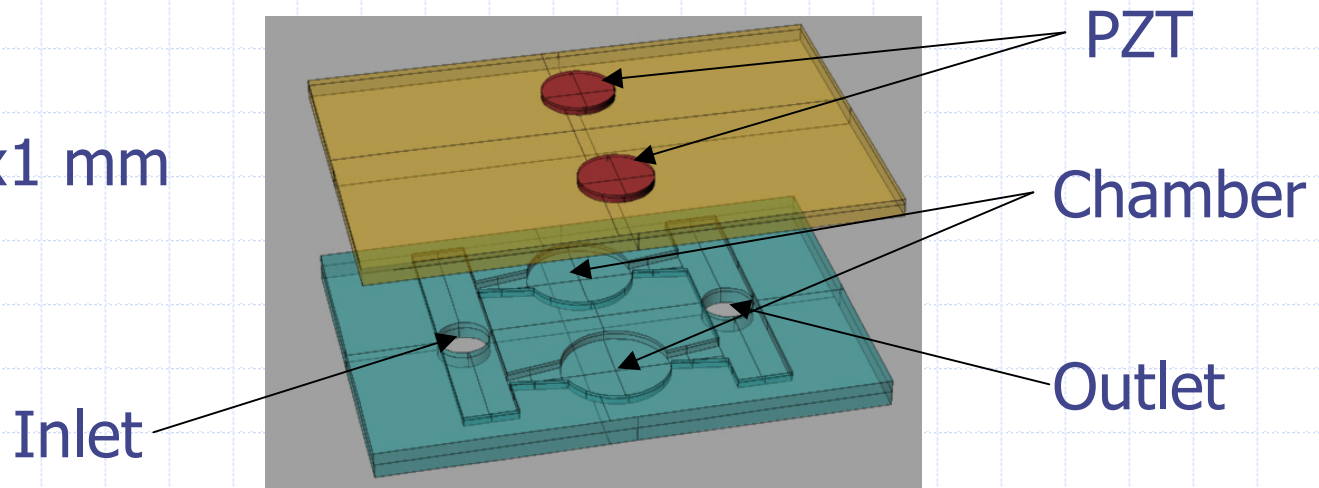
Piezoelectric

Electro-osmosis
Electrohydrodynamic

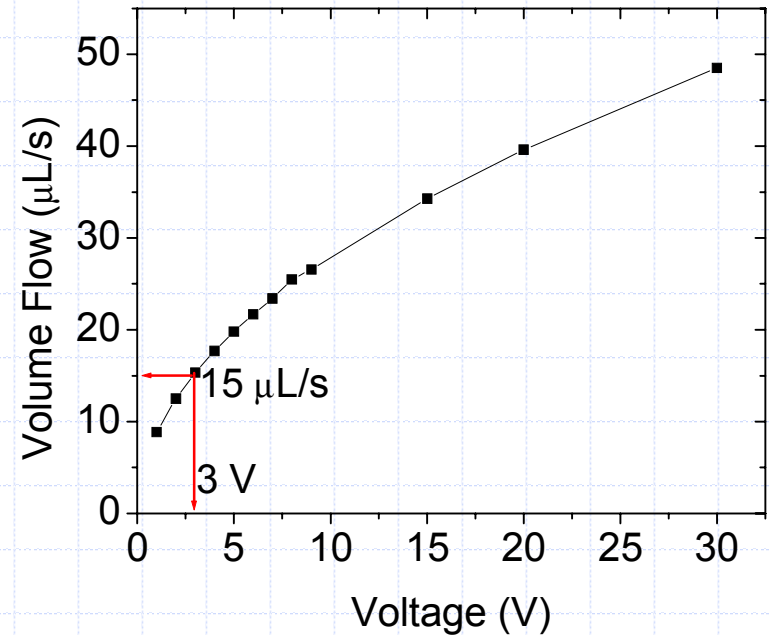
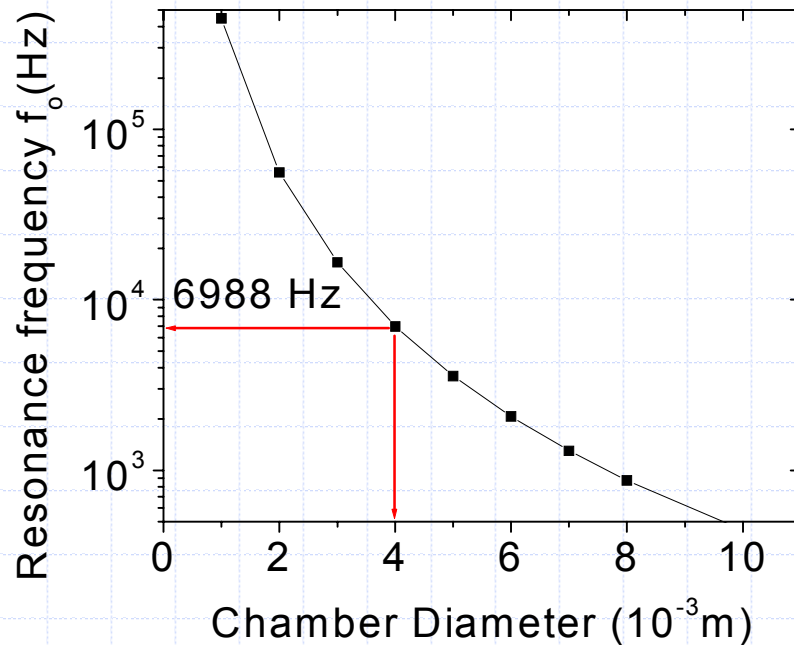
Proposed Design

- ◆ Piezoelectric actuator
- ◆ Diffuser/Nozzle
- ◆ Two chambers
- ◆ Silicon Base/Glass membrane

12x12x1 mm



Performance



Maximum Back Pressure = 0.267 m H₂O at 3 V
Power consumption = 3.3 mW

Fabrication

◆ Silicon Base

- ◆ Wet etch – inlet/outlet
- ◆ DRIE – chamber + diffuser/nozzle

◆ Glass Top

- ◆ Bonding – glass membrane
- ◆ Bonding – PZT discs