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# InVitroMetrix QCM-Based Cell Biosensor: Research tool to accelerate pharmaceutical drug discovery success

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# InVitroMetrix

QCM-Based Cell Biosensor

Research tool to accelerate pharmaceutical drug discovery success

*Abiche H. Dewilde Ph.D.*

*UMass Lowell*

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# Disclosure

- Grant/Research Support: Army Research Labs
- Major Shareholder: InVitroMetrix
  - President of InVitroMetrix

# The research

- We wanted to measure in real time the changes that were happening with cells
  - Nanocananry

**Analytes**
- Drugs
- Vitamin
- Pollutant
- Chemical

+

**Bio-Element**
- Cell
- Enzyme
- Antibody
- Microbe

+

**Sensed Property**
- Mass
  Viscoelasticity
- Temperature

+

**Transducer**
- Piezoelectric
- Optical
- Thermal
- MEMS

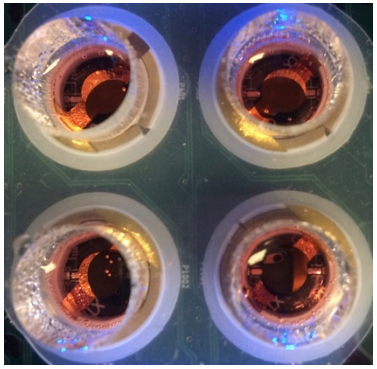
=

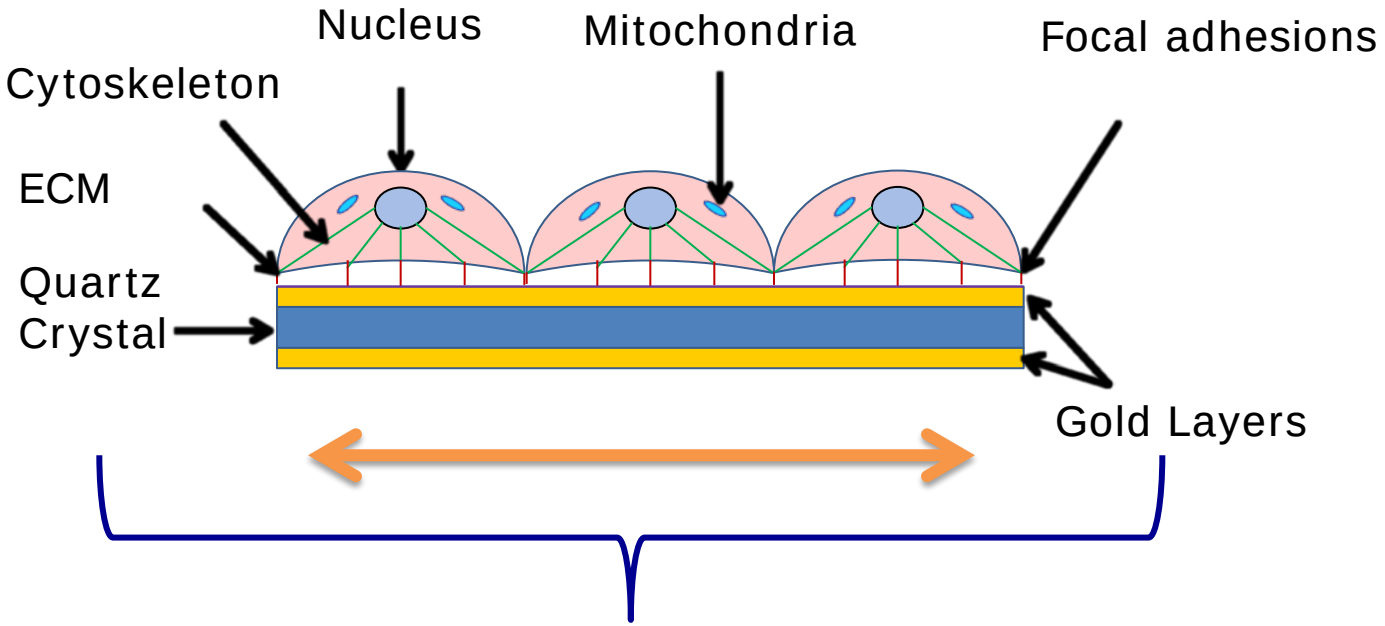
Quantifiable signal

Piezoelectric: Quartz Crystal Microbalance (QCM)

Optical: Surface Plasmon Resonance (SPR)

# Whole Cell Quartz Crystal Microbalance






Living whole cell biosensor

Measurable changes in cellular biomechanics:
attachment, mass redistribution, viscoelasticity

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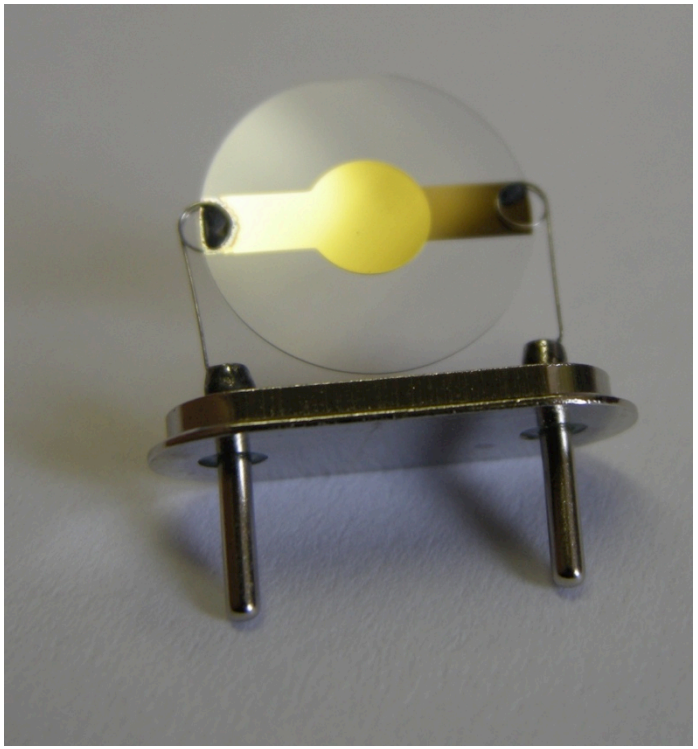
# The problem

The chemist tool



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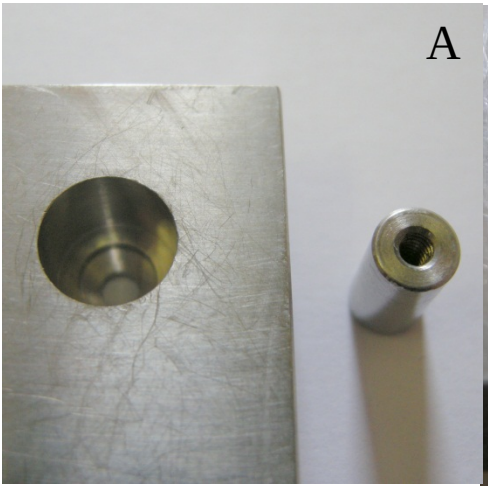
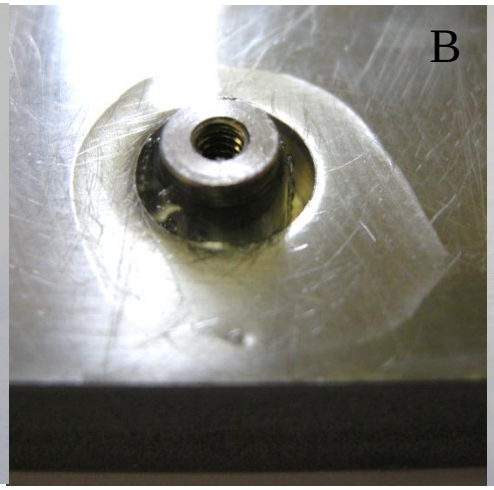
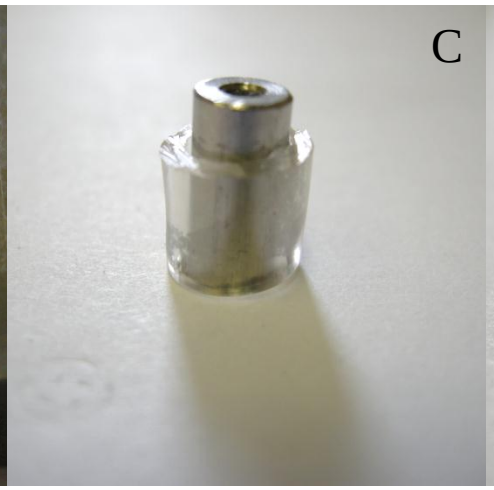
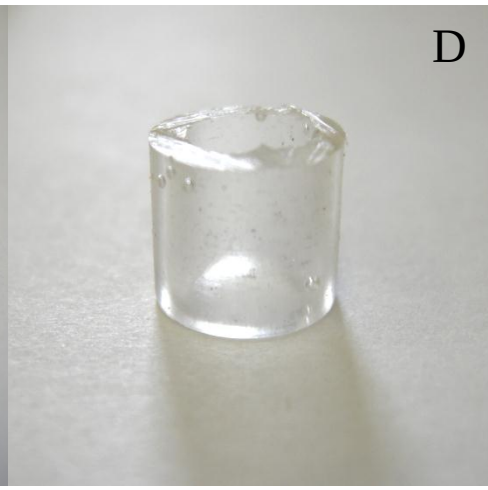
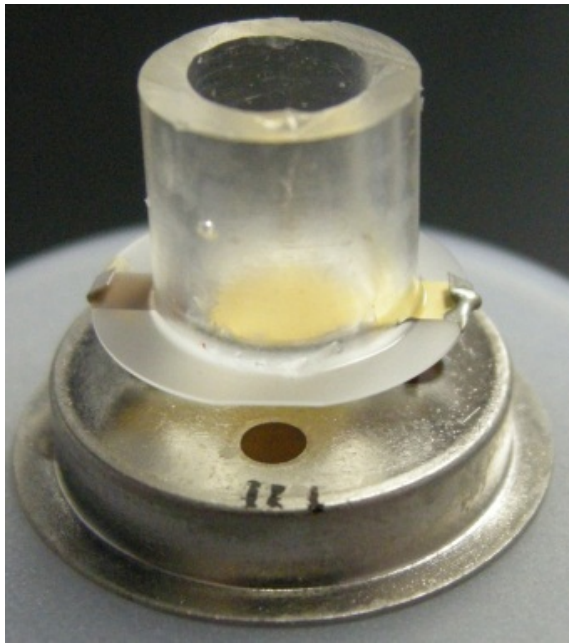
# Prototypes V1



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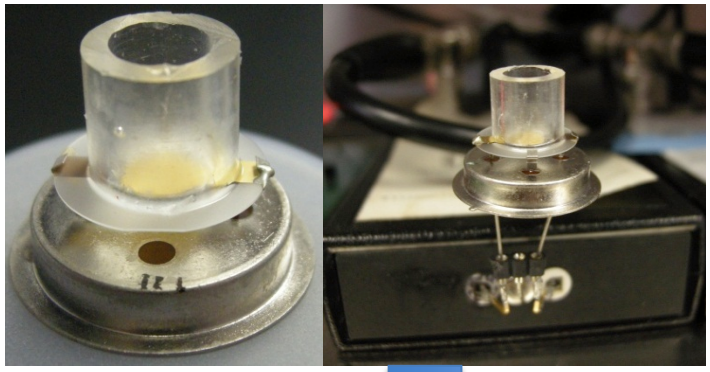
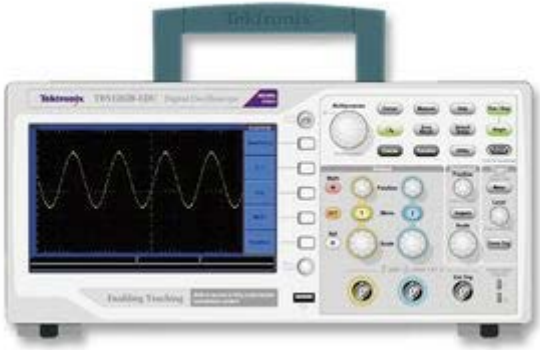
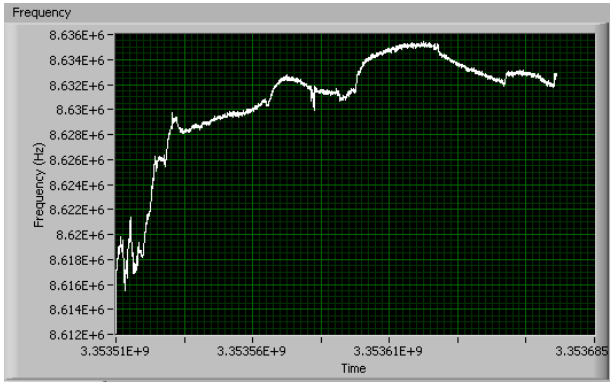
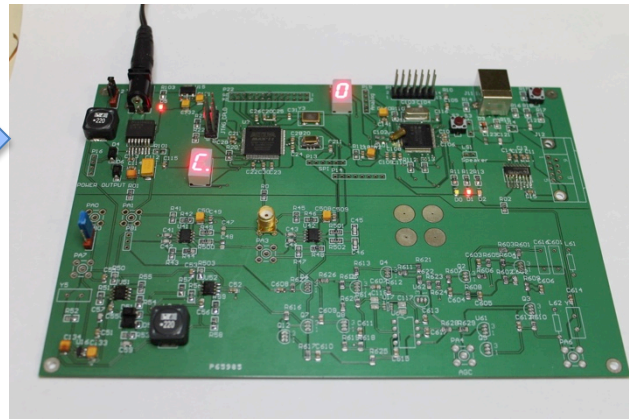
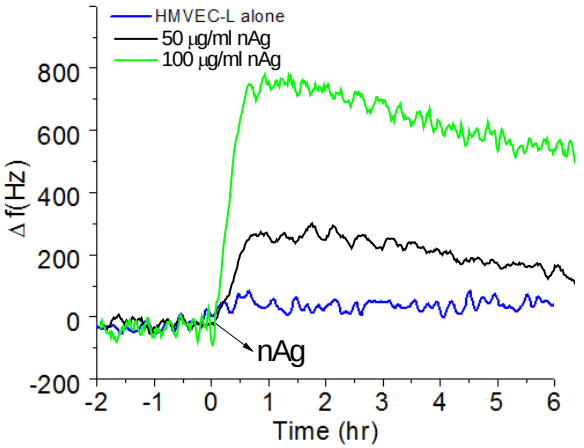
# Prototypes V1 and V2










PROBLEM= ONLY ONE WELL

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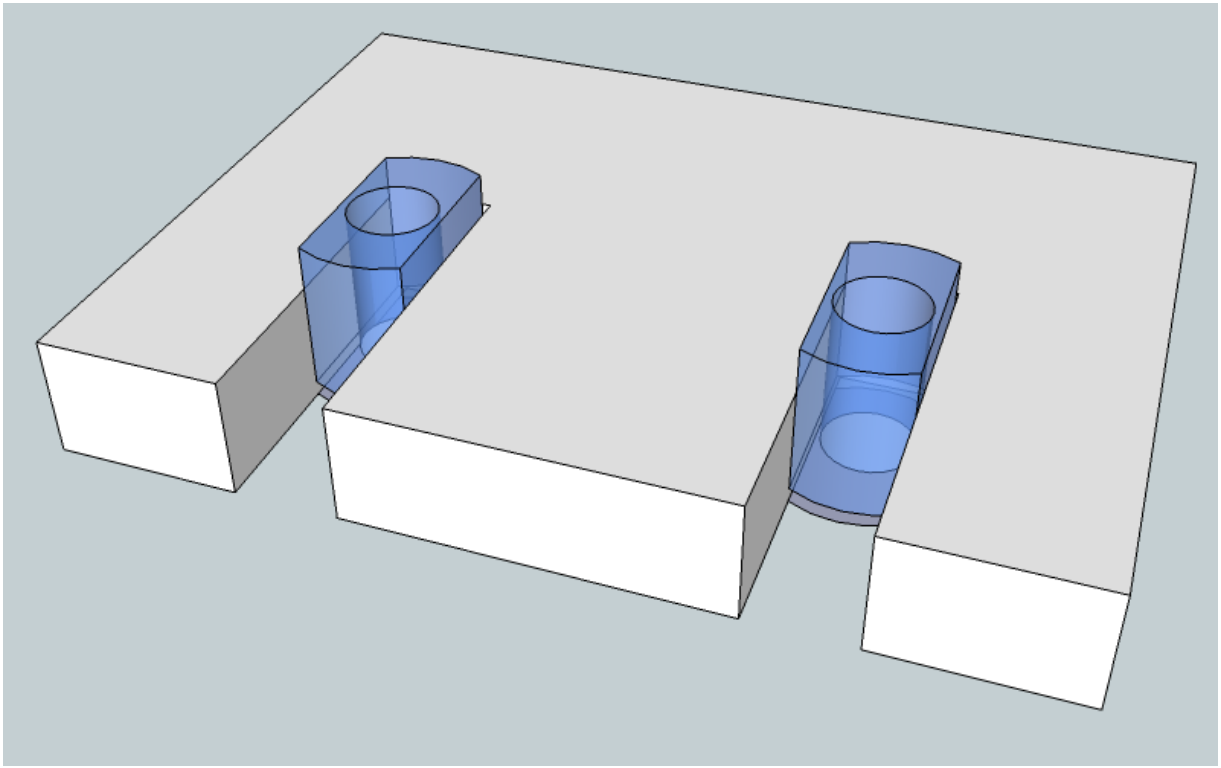
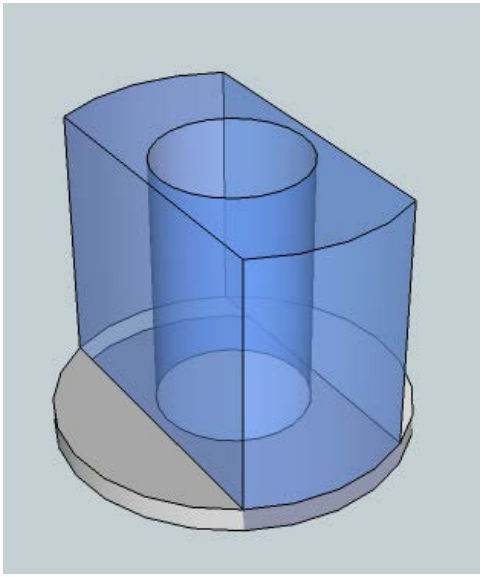
# Prototype Concept 2





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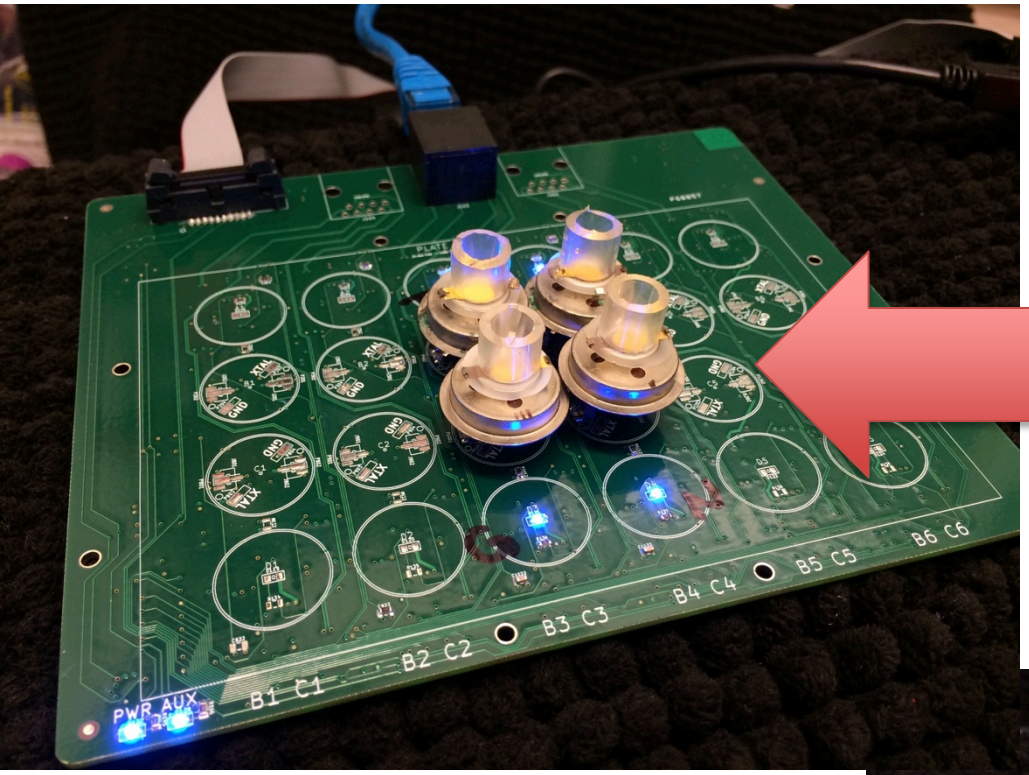
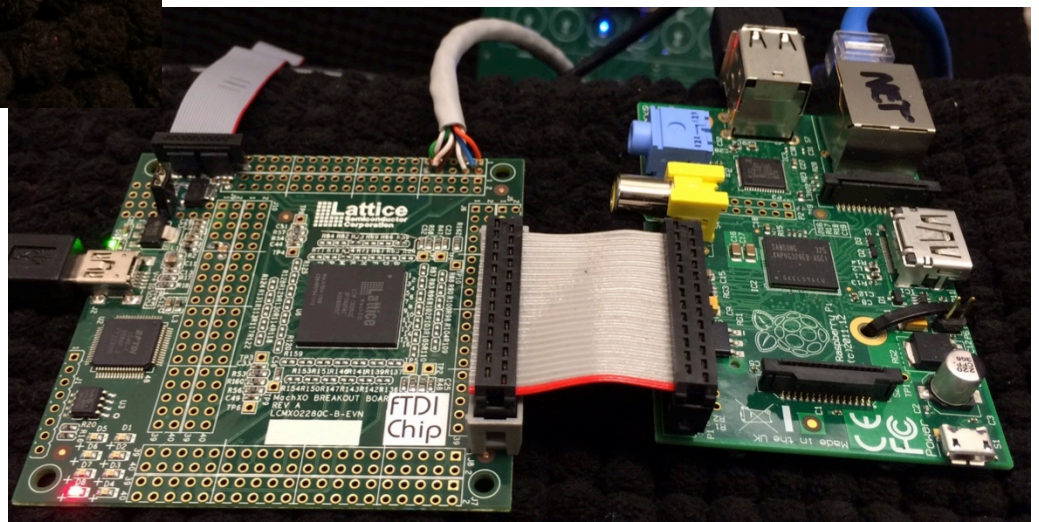
# Prototype V3




PROBLEM=
WEAK
CONNECTIONS



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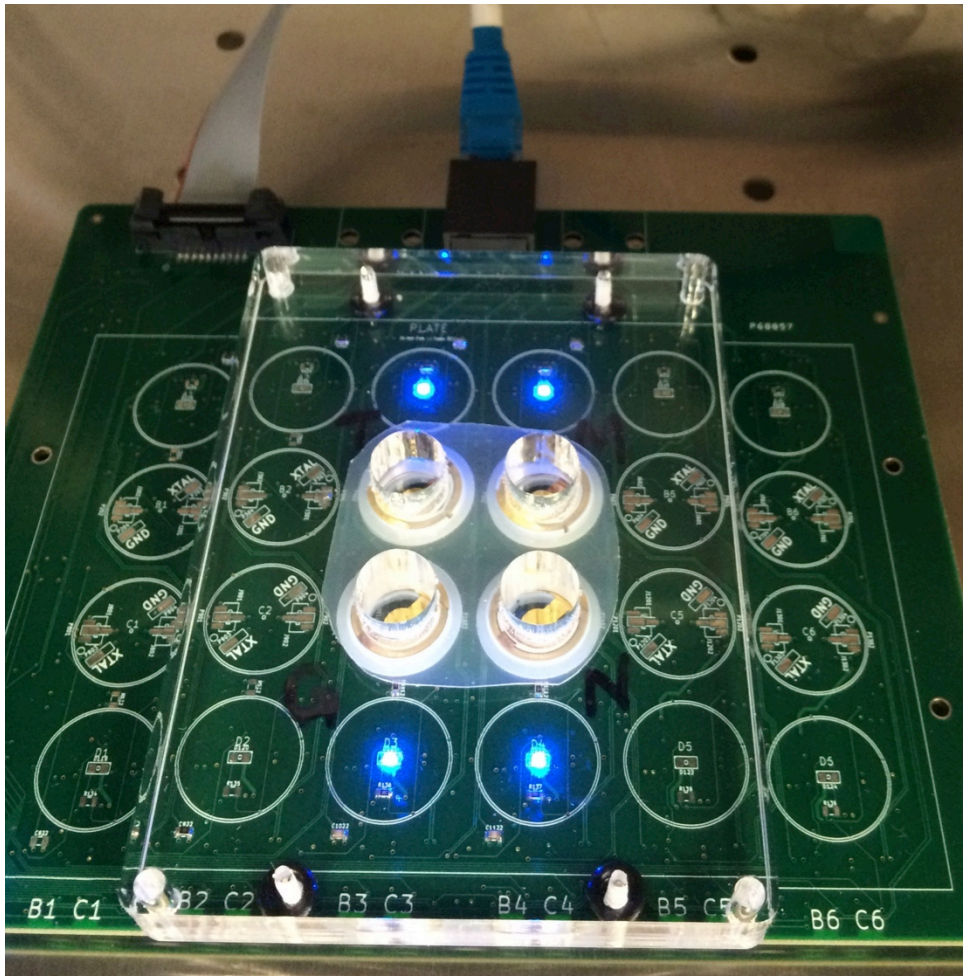
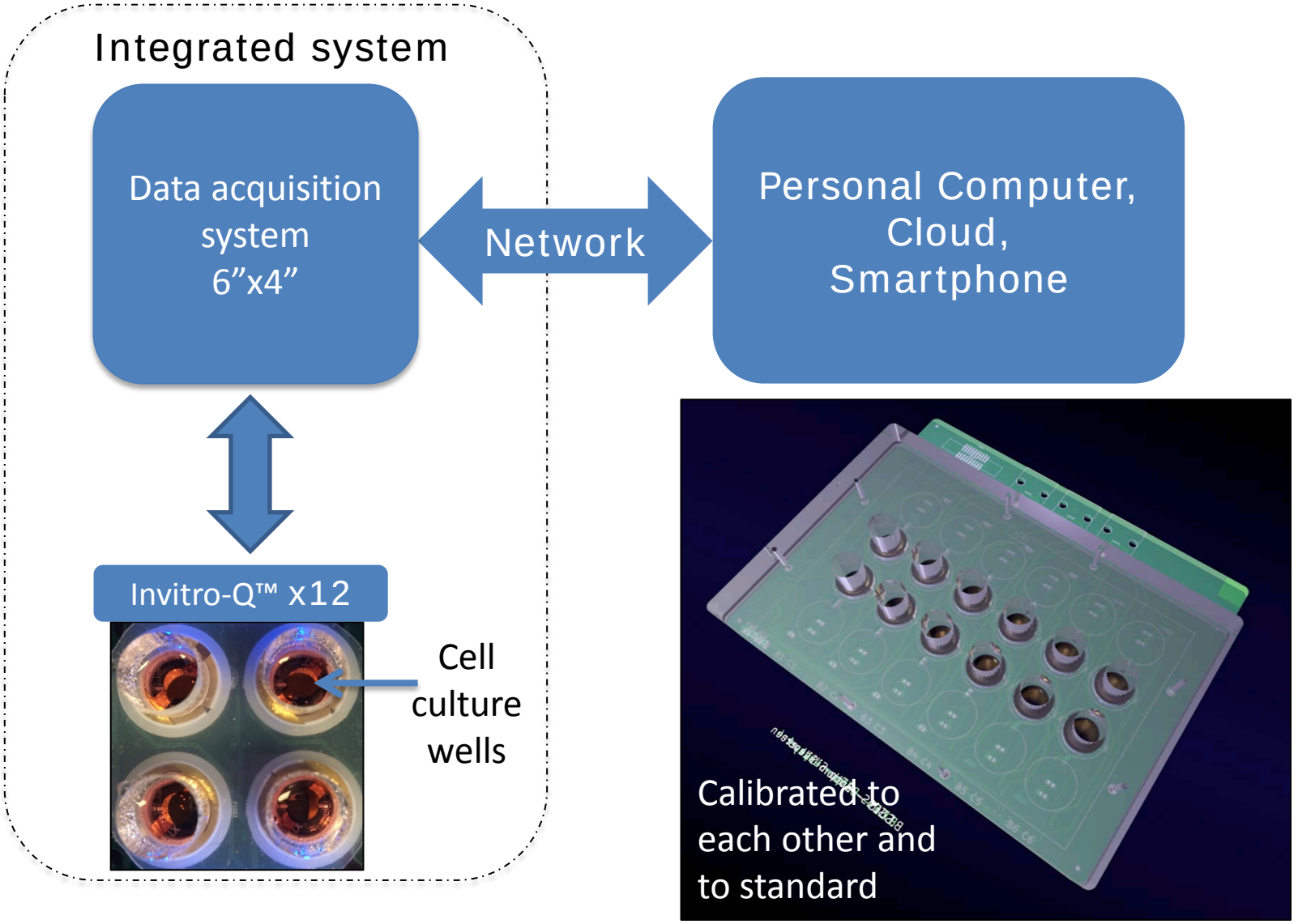
# Prototype V4




INNOVATION= CAN WE HAVE 12 WELLS?

# The solution- Invitro-Q™

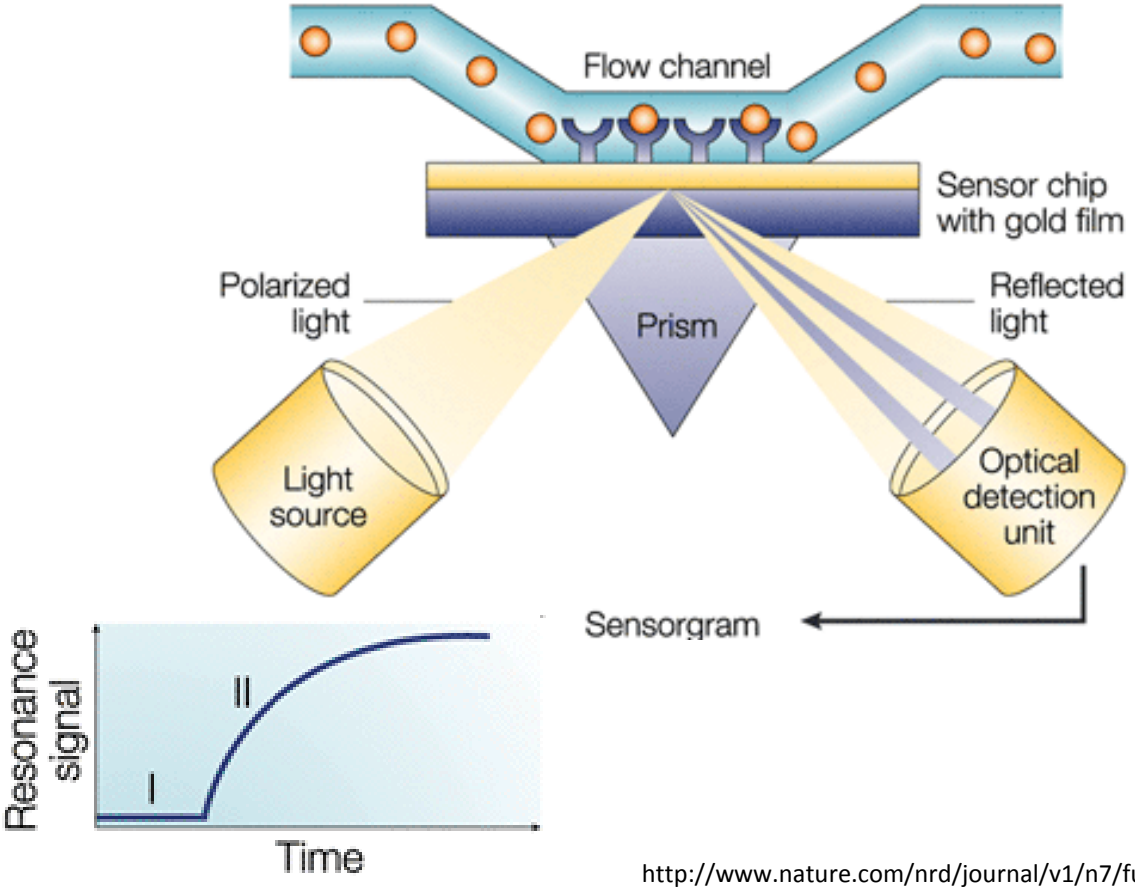


# Commercialization Research

- LOCK DOWN YOUR IP
- Competitive edge

# The competition

- Micro Analysis Systems - Biacore (SPR)
  - Problem: single component systems



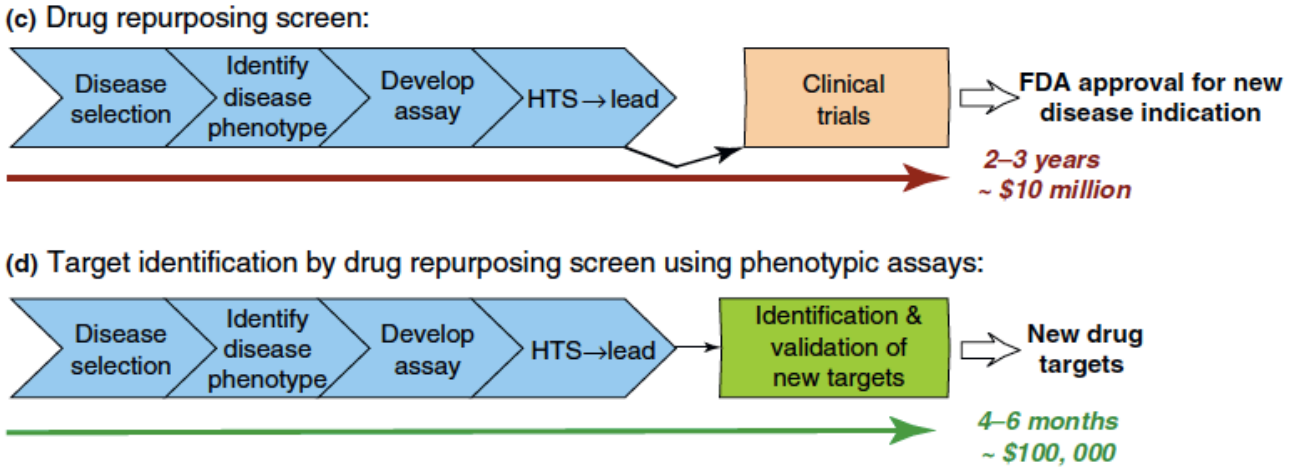

http://www.nature.com/nrd/journal/v1/n7/full/nrd838.html

# Commercialization Research

- LOCK DOWN YOUR IP
- Competitive edge= We can do whole cells
- Market size= Can we be profitable
- Customer needs= TALK TO THE USERS
- Value proposition
  - The User= 12 wells
  - Who will buy it=> Savings to company?
    - INVESTORS: they want to see this

# Value Proposition
# Drug discovery and orphan drugs

- Cell assays are more successful at identifying first in class small molecule drugs
- Orphan drug repurposing $10M/2-3yrs ➔$100K/4-6mo




[1] Drug discovery today http://dx.doi.org/10.1016/j.drudis.2013.07.001

# Commercialization Research

- Competitive edge
- Market size
- Customer needs
- Value proposition
- Go to market strategy
  - FORM THE COMAPNY

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# Formation

- Legal paperwork
  - Entity, EIN, DUNS, SAM, NSF/NIH, Bank Accounts
- The Team
  - Diverse team with different expertise
- Find a research location
- Ask/convince Scientific Advisors to join
- Find wonderful mentors
- GET THE MONEY
- Get the prototype into people's hands

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# Up Next

- Move to our new lab
- Finalize the product
- Validation
- Release first product
- Start researching next designs- SBIR/NSF
- More Money!

UMASS M2D2
Massachusetts Medical
DEVICE DEVELOPMENT CENTER

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*i*Hub

# Thank you

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