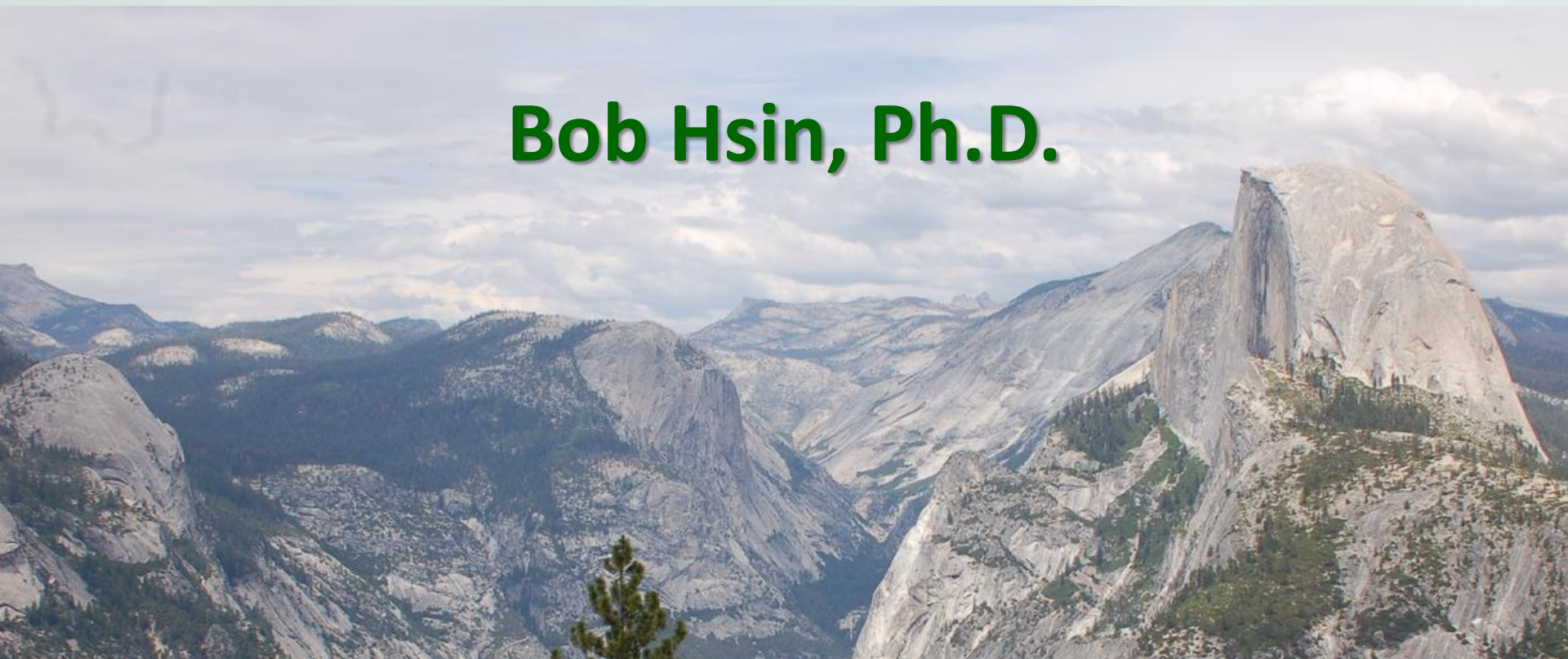


Advanced Biomedical Materials

Bob Hsin, Ph.D.



Goal

- **Innovative Antimicrobial Materials**
- **Product Development and Applications in:**
 - **Medical Devices**
 - **Healthcare**
 - **Personal Care**
 - **Clothing**

Healthcare Issues

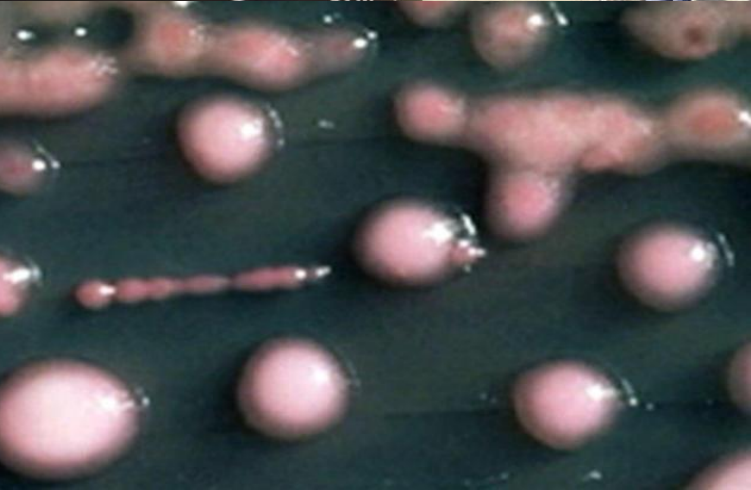
- Outbreak of **major diseases**
- **Spread of superbugs and bacteria** like MRSA and E. Coli

➤ **The need for antimicrobial products has increased**



Example of Affected Medical Devices

- 2015, Superbug at UCLA Medical Center



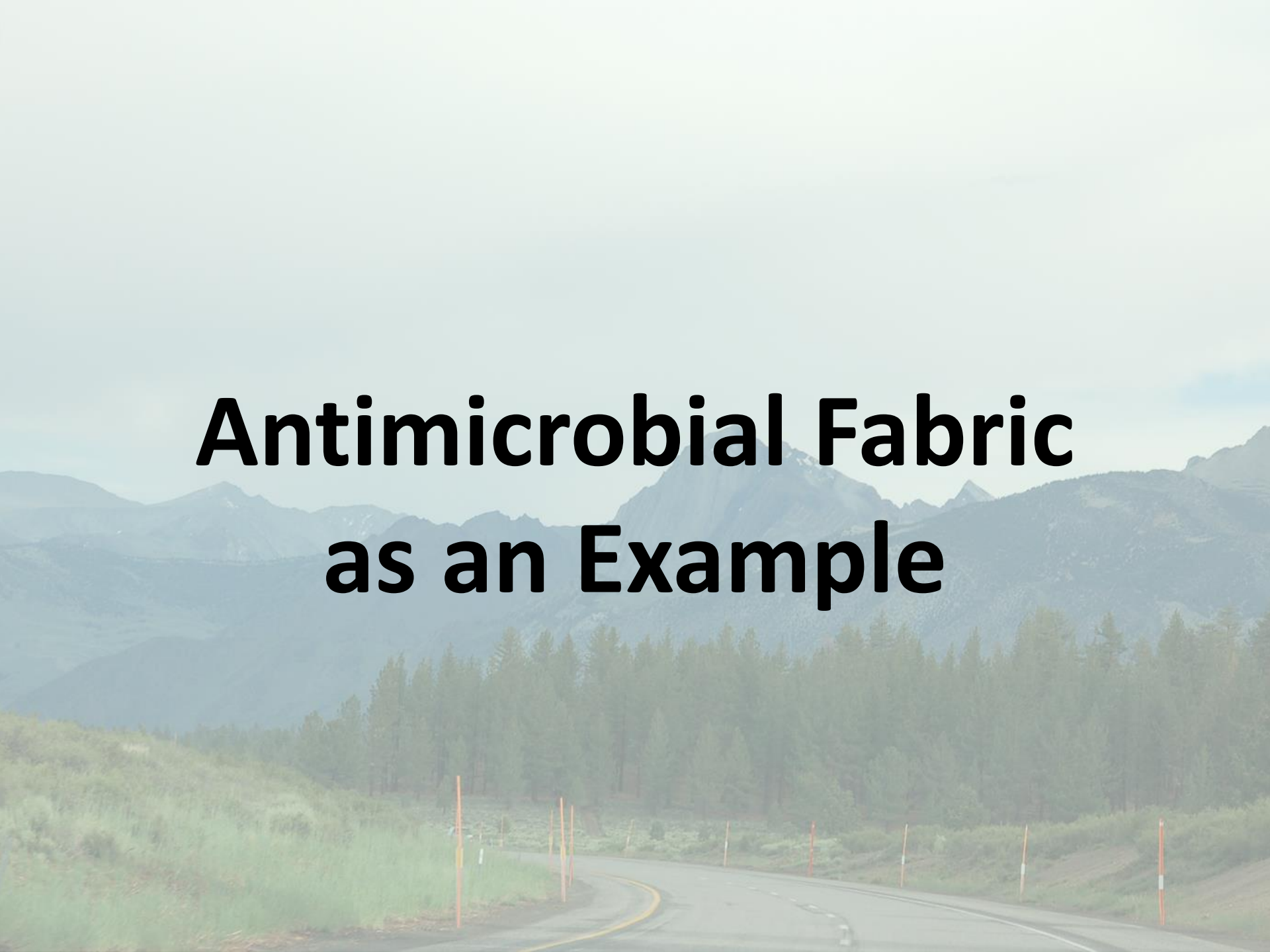
Results:

- 2 Deaths
- ~ 200 potentially exposed

Product Issues

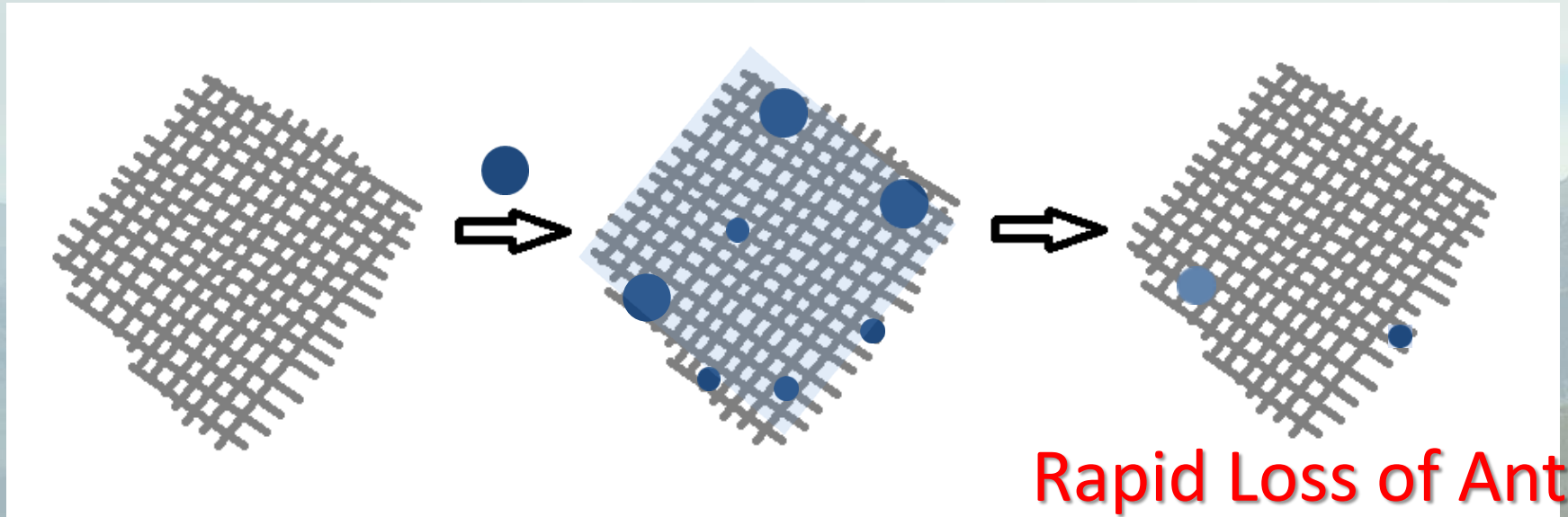
- **Major challenges:**
 - **Lack or rapid loss of antimicrobial properties**
 - **Use of toxic agents/heavy metals**
 - **Environmental concerns**

Antimicrobial Fabric as an Example



Current Processes

Fabric → Surface Treatment → Washing

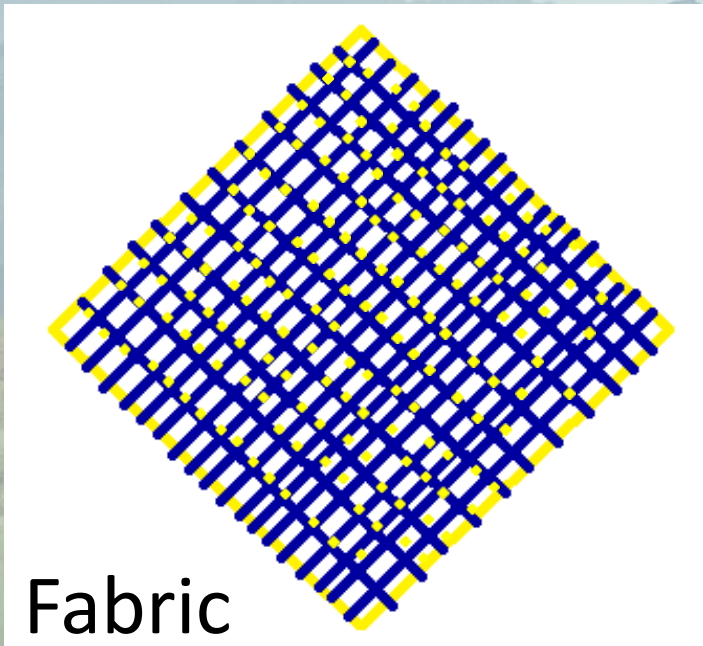
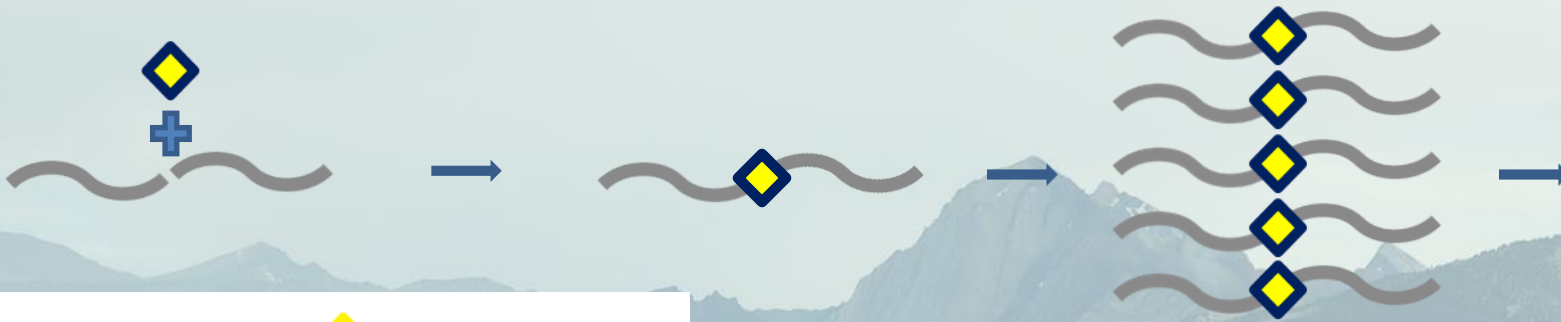


**Rapid Loss of Anti-
microbial Property!**

● Antimicrobial agent

Our Solution:

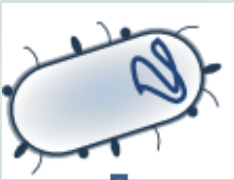
NP*-ABM \rightarrow Hybrid Polymer* \rightarrow Fiber \rightarrow Fabric



Long Lasting
Non-Leaching
Nonmetal
Low Cost
Easy to Process

Mechanism

Surface charge:
negative



ABM particle:
positive



Compromised
cell membrane



**Death
of
Bacteria**

Antimicrobial Testing

Sample	Lab-Synthesis	Pilot-Production	Fabric/Fiber
Size/Format	2 grams	> 10 Kg pellets	Fabric (2 %)
ASTM Method	2149	2149/2315	2149
Species Tested*			
<i>K. pneumonia</i>	> 99.99 %	> 99.99 %	> 99.15 %
<i>S. aureus</i>		> 99.98 %	> 97.13 %

* Results shown in % reduction

Antimicrobial Fiber/Fabric Progress

- ☒ Lab-scale synthesis
- ☒ Antimicrobial testing
- ☒ Pilot-scale pellet/fiber/fabric production
- ☒ Antimicrobial testing
- ☒ Scale-up
- ☐ Full production

Current Collaborators/Partners

- ***Listed Textile Companies***

- Manufacturers of high-end functional fabrics:

Supply chains of

➤ ***Nike***

➤ ***Reebok***

➤ ***Lululemon***

- ***Listed Nonwoven Fabric Companies***

- Manufacturers of:

✓ ***Wet wipes***

✓ ***Facial Masks***

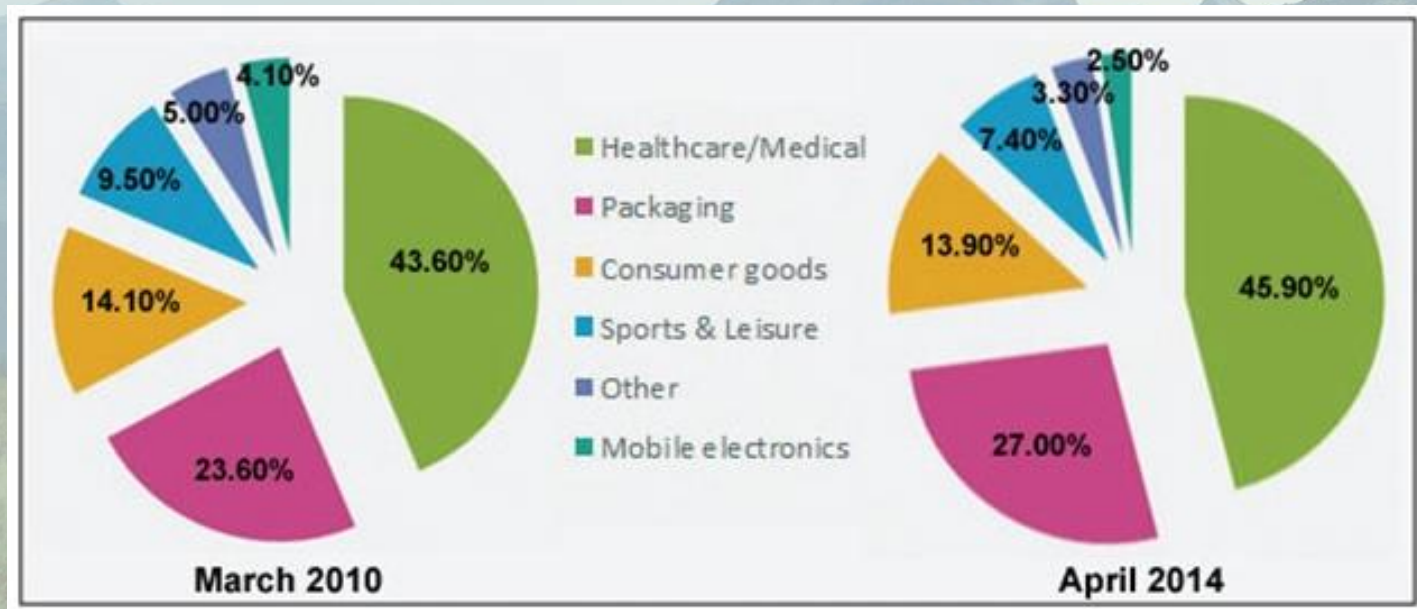
✓ ***Material for***

❖ ***Surgical gowns***

❖ ***Medical linen***

Potential Future Markets

- Medical Devices
- Packaging
- Electronics
- Others



*source: Market and Market Research 2014

The Road Ahead...

- Looking for strategic partners
- Development of high-value devices
- Development of cutting-edge biomedical products

Bob Hsin, Ph.D.

- **2016-present, Founder,
Advanced Biomedical Materials Inc.**
- **2012-2015, Visiting Scholar,
UCLA**
- **2009-2012, Assistant Professor,
University of Massachusetts**