Lessons Learned from both seeking industry funding and working with companies on sponsored research projects.

Chris Batic, Professor in Materials Science and Engineering Department, and joint with BME Department, UF; Public-Private Partnership Program Director, Clinical Translational Science Institute (CTSI)

cbati@ufl.edu
Partnering with Industry Workshop
April 24 2014
Recent consultant with:
* Xhale, Inc. (including joint IP)
* QuickMed, Inc (including joint IP).
* HyGreen, Inc. (including joint IP).
* Convergent Engineering. (including joint IP)
* Materials Consultants, Inc.
* Pest Natural, Inc. ((including joint IP, active project via FHTC).

Funding:

Pest Natural, Inc., NIH (CTSI), Hyundai
* PhD: Organic Chemistry (Rutgers)
* Post-doc (U. Basel, Switzerland, P-Chemistry)
* DuPont Central Research and Development Dept.
* UF: helped start up BME graduate program, CTSI.
* Most research is on polymer for medical use.
* Co-inventor on c. 60 patents issued via UF
* Identify a clear need that industry already perceives, and have a solution for that need that is practical.

* Have an ongoing personal relationship with one or more key personnel within an industry and work to find an area of mutual interest.

* (a third alternative is to start a small company and keep actively involved for years).

* Forming a partnership with industry has two often used routes:
* OTL
* FHTC
* CTSI (pilot project funding, biostatistics assistance, biorepository, connections to medical faculty members, RedCap, ethics advice, research participants, etc., etc.): ctsi.ufl.edu

Help available from UF:
Three success stories (i.e., product on the market)


* Nanotherics. Magnetic gene delivery (via ongoing personal contact)

* Xhale/HyGreen: hand-washing monitor for hospitals (via ongoing personal contacts).
Bioguard
An innovation in Wound Care Technology:

clinical needs gave rise to technical challenges and innovations that a team has brought to the market along with the steps required to achieve clinical use
* Identification of a problem area.
* Recruitment of key team members.
* Refinement of the problem.
* Adding team members as needed.
* Proposed solutions, testing, intellectual property (IP), real-world testing, commercial partners, marketing.

**Keys to success:**
* Began with a phone call in about 1998 from a Manhattan garment industry purchaser to the “President of the Wound Healing Society” who was an Ob/Gyn faculty member at UF (Dr. Greg Schultz).

* Had seen, in Mexico, an alginate/hydrogel film that looked like an excellent dressing. Testing?

* Biocidal Dressing example
* The alginate film was very weak, and fractured when pulled gently. But Dr. Schultz knew someone in Materials who could help make it stronger.

* We figured out how to make it stronger, but then met with a plastic surgeon at Shands (Dr. Bruce Mast), who suggested that there were related products on the market.

* Would making it biocidal help?
The alginate film was very weak, and fractured when pulled gently. But Dr. Schultz knew someone in Materials who could help make it stronger.

We figured out how to make it stronger, but then met with a plastic surgeon at Shands (Dr. Mast), who suggested that there were related products on the market.

Would making it biocidal help? (Dr. Bruce Mast: “YES!”)

Materials Science and Engineering Issues?
Dow-Corning (DC-5700) was a polyquat coupling agent applied to carpets to kill bacteria:

http://www.lookchem.com/cas-276/27668-52-6.html
Dow-Corning (DC-5700) was a polyquat coupling agent applied to carpets to kill bacteria:

Was expensive, hydrolysis possible, highly crosslinked, short chains.

http://www.lookchem.com/cas-276/27668-52-6.html
* Make a polyquat polymer of high molecular weight attached to surface?
* Add a consultant who worked for large medical device companies on biocidal materials (Dr. Olderman).
* Filed a patent disclosure
* Arranged testing at a microbiology lab.

* Make an carbon-based alternative?
Using known chemistry in a new way:

**Synthesis of Poly-DADMAC**

![Chemical diagram](http://www4.ncsu.edu/~hubbe/DADM.htm)

*M. Hubbe*
E. Coli and red indicator were spread on gauze squares and incubated (QuickMed)
*UF OTL for patent help*
United States Patent

Batich et al.

Patent No.: US 7,045,673 B1
Date of Patent: *May 16, 2006

Intrinsically Bactericidal Absorbent Dressing and Method of Fabrication

Inventors: Christopher D. Batich, Gainesville, FL (US); Bruce A Mast, Gainesville, FL (US); Gregory Schultz, Gainesville, FL (US); Gerald M. Olderman, New Bedford, MA (US); David S. Lerner, Boca Raton, FL (US)

Assignees: Quick-Med Technologies, Inc., Gainesville, FL (US); University of Florida Research Foundation, Inc., Gainesville, FL (US)

Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

Appl. No.: 09/857,906
PCT Filed: Dec. 8, 1999
**United States Patent**

**Batich et al.**

**INTRINSICALLY BACTERICIDAL ABSORBENT DRESSING AND METHOD OF FABRICATION**

**Inventors:**
- Christopher D. Batich, Gainesville, FL (US)
- Bruce A Mast, Gainesville, FL (US)
- Gregory Schultz, Gainesville, FL (US)
- Gerald M. Olderman, New Bedford, MA (US)
- David S. Lerner, Boca Raton, FL (US)

**Assignees:**
- Quick-Med Technologies, Inc., Gainesville, FL (US)
- University of Florida Research Foundation, Inc., Gainesville, FL (US)

<table>
<thead>
<tr>
<th>Patent No.</th>
<th>Date</th>
<th>Inventor(s)</th>
</tr>
</thead>
<tbody>
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<td>3/1977</td>
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</tr>
<tr>
<td>4,791,063</td>
<td>12/1988</td>
<td>Hou et al.</td>
</tr>
</tbody>
</table>
(12) United States Patent
Batic et al.

(10) Patent No.: US 7,709,694 B2
(45) Date of Patent: *May 4, 2010

(54) MATERIALS WITH COVALENTLY-BONDED, NONLEACHABLE, POLYMERIC ANTIMICROBIAL SURFACES

(75) Inventors: Christopher D. Batic, Gainesville, FL (US); Gregory Schultz, Gainesville, FL (US); Bruce A. Mast, Gainesville, FL (US); Gerald M. Olderman, New Bedford, MA (US); David S. Lerner, Boca Raton, FL (US); William Toreki, Gainesville, FL (US)

(73) Assignees: Quick-Med Technologies, Inc., Gainesville, FL (US); University of Florida Research Foundation, Inc., Gainesville, FL (US)

( *) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1637 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: 09/965,740
(22) Filed: Sep. 28, 2001
*Worked much better than competition.*

* Much less expensive
* Much more stable
* Much more effective at killing, even in the presence of serum
* Easy to attach to cellulose (cotton or rayon)
*Worked much better than competition*

* Much less expensive
* Much more stable
* Much more effective at killing, even in the presence of serum
* Easy to attach to cellulose (cotton or rayon)

However: Needed FDA clearance and a commercial partner
Cellulose (gauze)
Immobilized
Polyquat
(licensed and sold by Derma Sciences)

http://www.dermasciences.com/products/
* Business model? IPO in c. 1999 for $5.00/share. Last 5 years. “P” = Public
*OTL is converting “nibbles” into identifying needs (cf. Bayer call)

*OTL is creating research groups of faculty that had no previous contact, into teams (Pest Natural).
* Greg Schultz, Bruce Mast, Jerry Olderman, David Lerner, Bill Toreki, David Moore, and many more at Quick Med.
* Jon Dobson, at Nanotherics. (as well as Barry Byrne and Cathrine Mah).
* Rich Melker, Donn Dennis, Tim Morey, Richard Allen, and many more at HyGreen.
* The many folks at the CTSI and OTL

*Thank you...and:
• NimbuDerm™ has broad spectrum efficacy.
• It kills bacteria, fungus and viruses instantly.
• It continues to function at a high level of efficacy for at least eight hours.
• It is easily applied and dries quickly.
• It can only be removed with a soap and water wash.
• The chemical formulation is unique and is based on a new form of a commonly know film-former.
• NimbuDerm™ is very cost effective.
• Two patents are pending and a third patent application is in process.
# Broad Spectrum Efficacy of NimbuDerm™ Skin Sanitizer*

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>ATCC#</th>
<th>% Kill</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>6538</td>
<td>99.9999%</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>15597</td>
<td>99.9999%</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>15442</td>
<td>99.9999%</td>
</tr>
<tr>
<td><em>Serratia marcescens</em></td>
<td>13880</td>
<td>99.9999%</td>
</tr>
<tr>
<td>MRSA</td>
<td>BAA-44</td>
<td>99.9999%</td>
</tr>
<tr>
<td>Vancomycin resistant <em>Enterococcus</em></td>
<td>700221</td>
<td>99.9999%</td>
</tr>
</tbody>
</table>

*Test method: modified AOAC Use-Dilution Test on pigskin carriers at a 4 hour exposure.
## Competitive Comparison

NIMBUS offers superior performance, price and safety

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>NIMBUS</th>
<th>Silver</th>
<th>Triclosan</th>
<th>PHMB</th>
<th>Silane Quaternary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness</td>
<td><strong>High</strong></td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Persistence</td>
<td><strong>High</strong></td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Leaching</td>
<td><strong>No</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Environmental Concerns</td>
<td><strong>No</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Bacterial Resistance</td>
<td><strong>No</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Possible</td>
<td>No</td>
</tr>
<tr>
<td>Cost</td>
<td><strong>Lowest Cost</strong></td>
<td>Expensive</td>
<td>Medium Cost</td>
<td>Medium Cost</td>
<td>Medium Cost</td>
</tr>
</tbody>
</table>
* Anything missing?
a. Burn patient donor site: strong odor is present.

b. Shows the same Donor Site after 24 hours of treatment with the BIOGUARD gauze bandages. It is apparent that exudate is present but the color and odor have improved.

L. Youngblood et al., Symposium on Advanced Wound Care, Spring 2011