

Conference on Bioengineered Glass-Ceramics ("The Hulbert Conference" – July 23/24, 2004, Buffalo, NY)

Final Report to The Whitaker Foundation

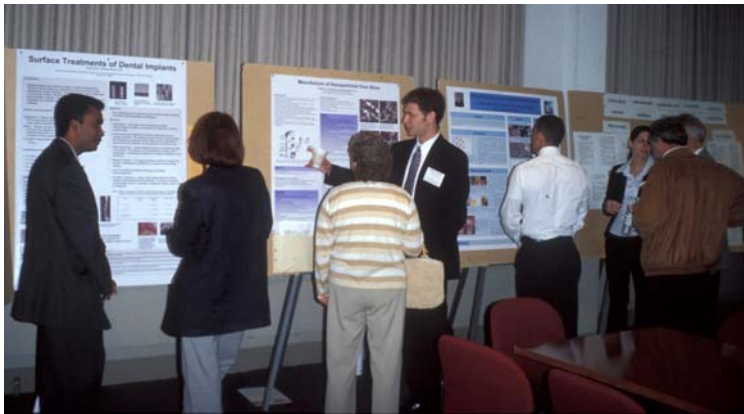
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Prepared by Anne E. Meyer, Ph.D.
Robert E. Baier, Ph.D., P.E.
Industry/University Center for Biosurfaces [IUCB],
and Biomaterials Graduate Program
University at Buffalo – 110 Parker Hall
Buffalo, NY 14214-3007
aemeyer@buffalo.edu
baier@buffalo.edu

Summary of the Conference

The agenda of the conference is attached. Over a 1-1/2 day period, student attendees mingled with senior faculty and researchers from universities and industry, to learn about the development and future of glass-ceramics in biomedical engineering. Students participated in all conference sessions, meals, and receptions.

The Whitaker Foundation was critical to the passage of the "torch" of glass-ceramic materials science to the new generation of aspiring bioengineers during the July 23/24, 2004 conference in Buffalo. In the weeks following the meeting, many of the student participants remarked how surprising – and unforgettable – it was that they were able to interact with the founders of the field of bioceramics, glass-ceramics, and biomaterials on several occasions during the meeting. Not only did the students and other attendees hear from the main honoree, Sam Hulbert, but they also listened to (and then asked questions of) Larry Hench, Jerome Klawitter, Robert Pilliar, Dianne Rekow, Van Thompson, Jack Lemons, and George Beall, among other speakers. Other attendees, such as Jim Anderson (Case Western Reserve University) were there to ask more probing questions and provide more background for the benefit of the students. Manuscripts from the conference speakers are in preparation for review and publication in the *Journal of Adhesion*. And, two of the student poster presenters also have prepared manuscripts for the same collection in the publication. All of the podium presentations were digitally taped, and master DVD's of the conference are valuable teaching aids for future students. Edited versions of the digital files will be available for viewing on IUCB's website in the future.



Attached is a list of the student poster presentations, as well as a list of the student attendees whose registrations were supported by The Whitaker Foundation. The students received significant one-on-one attention from the more senior researchers, particularly during the poster session and coffee breaks. Student posters were on display in the break/reception room for the entire meeting.

While the formal presentations and question/answer periods were outstanding, even more value of the conference came from discussion during the coffee breaks, meals, and receptions.



During the reception on the first evening, attendees also were treated to the thoughts of Professor Albert Einstein (portrayed by Dr. Ronald Palmer, a graduate of Alfred University's ceramics program) on the use of glass-ceramics and the politics of medical implant research.

On the second day, all conferees took a short walk to lunch, past the new construction on the Buffalo/Niagara Medical Campus. One of the new buildings will house the Hauptmann-Woodward Research Institute, the working home of Nobel Prize recipient and crystallographer Herbert Hauptmann. Another will house University at Buffalo's bioinformatics research and development programs.

All of the new construction is immediately adjacent to the Roswell Park Cancer Institute, the country's first research and clinical institution dedicated to the understanding and treatment of cancer.



Lunch was held in Ulrich's Tavern, the oldest remaining tavern in the city of Buffalo. Conferees were treated to a short history of the tavern and Buffalo culture during the 1800's and early 1900's.



After the formal, technical session ended on the second day, the conference participants adjourned to the conference hotel for a closing reception hosted by Alfred University. It was a time for more discussion about the science and for special presentations to Sam Hulbert -- from Dr. Antonio Ravaglioli (Italy) and from Alfred University. Good stories of past collaborations abounded and several promising new experiments were designed. We are deeply grateful to The Whitaker Foundation for supporting this conference.



How Whitaker Foundation Funds were Used

Funds from The Whitaker Foundation were used to support student meeting registration. Twenty-one students registered for and attended the meeting. A list of the students, their advisors, universities, and departments is attached. Meeting registration (\$60 per person) was used to partially support the lunches and breaks. A total of \$1260 of funds from The Whitaker Foundation was used to support student registrations. The balance of the \$3000 award (\$1740)

will be returned to The Whitaker Foundation from the Research Foundation of SUNY. More extensive promotion of the conference by the organizers would have resulted in greater attendance by students. In retrospect, however, the reduced number of registrants resulted in a better conference, as the students had greater access to the invited speakers.

Other Funding Received to Support the Conference

In addition to student support from The Whitaker Foundation, the July 23/24, 2004 conference was supported by State University of New York's "Conversations in the Disciplines" program (\$4000), by Ivoclar North America (\$9500), by Roswell Park Cancer Institute (in-kind provision of meeting spaces, equipment, IT technician, and poster boards/supports), and by additional attendee registration fees. The SUNY funds were used for speaker honoraria and publication supplies, while the Ivoclar funds were used for speaker travel (L. Hench, S. Hulbert, W. Höland, J. Lemons) and the Friday evening reception. A closing reception was hosted by Alfred University at the conference hotel.

Future, Related Activities Resulting from this Conference

A series of similar conferences has been inspired from the July 23/24, 2004 conference in Buffalo. As part of the 2005 annual meeting of the Canadian Biomaterials Society (May 26-28, 2005, Waterloo, Ontario), a special symposium is planned in honor of Professor Robert Pilliar, who will retire from University of Toronto in 2005. And, on September 29/30, 2005, a symposium will be held in the United Kingdom to honor Professor Larry Hench (Imperial College London) and Professor Bill Bonfield (University of Cambridge), based on the model of the 2004 conference in Buffalo. Both Professors Pilliar and Hench were invited speakers at the conference in Buffalo. Several of the U.S. speakers already have agreed to participate in the September 2005 symposium.

The Hulbert Conference: Bioengineering with Glass-Ceramics

Final Agenda

Friday, 23 July 2004 [all activities at Hilleboe Auditorium and Gaylord Room]

- 1100 - noon set up posters and technical displays
noon registration and buffet lunch
1300 Welcome and Overview -- Robert Baier
1315 Introduction of Distinguished Guests and Speakers -- Alexis Clare
1330 21st Century Bioengineering Challenges for Glass-Ceramics -- Larry Hench
1400 20th Century Successes of Materials of Construction for Artificial Bone -- Sam Hulbert
1445 *coffee break*
1515 Introduction of Keynote Speaker -- George Tysowsky
1530 Glass-Ceramics for Medical Applications and Dental Restoration -- Wolfram Höland
1615 questions and discussion
1700 close of Friday technical session; announcements regarding Saturday session
1730 *Reception - Hosted by Ivoclar North America,
with comments from Albert Einstein (Ronald Palmer)*
>>>> dinner on your own in Downtown Buffalo/Niagara Falls (chicken wings, casinos,...)

Saturday, 24 July 2004 [all activities at Hilleboe Auditorium and Gaylord Room, unless noted otherwise]

- 0830 *continental breakfast*
0900 New Educational Opportunities in Inorganic Biomaterials -- Robert Baier
0930 Educational Opportunities in Photonics and Biophotonics -- Alexis Clare
1000 Introduction of Keynote Speaker -- Thomas Hill
1015 Discovery and Design of Glass-Ceramics -- George Beall
1100 review of student posters and technical displays
noon buffet lunch & a history lesson at Ulrich's Tavern (674 Ellicott – Buffalo's oldest tavern)
1300 Transition: from Clemson Symposium to Hulbert Conference -- Jack Lemons
1330 Bioactive Materials for Tissue Engineering -- William LaCourse & David Greenspan
1400 Durable Reconstructive Materials for Biomechanical Challenges -- Jerome Klawitter
1430 Glass-Ceramics Research for Dental Applications -- Dianne Rekow & Van Thompson
1500 Porous Calcium Polyphosphates for Repair of Osteochondral Defects -- Robert Pilliar
1530 *coffee break and discussion*
1600 Calcium Silico-Phosphates for Biomedical Use – Antonio Ravaglioli & Roberta Martinetti
1630 Improved Biomechanical Properties of Bone Cement – Subrata Saha
1700 Closing Remarks and Walk to Hotel for Reception
>>>> *Reception - Hosted by Alfred University [Pillars Hotel], to 7:00pm*

The Hulbert Conference: Bioengineering with Glass-Ceramics
July 23 and 24, 2004 (Buffalo, NY)

Student Poster Presentations

Carrie Buckley – University at Buffalo Biomaterials Graduate Program	Fiber optic detection of dried biological substances
Mallika Chary – University at Buffalo Biomaterials Graduate Program	Fate and distribution of HT fiber in rat lungs
Michael DuVal – University at Buffalo Biomaterials Graduate Program	Surface chemical displacement of inaccessible contaminants in piping channels
James Fick – University at Buffalo Biomaterials Graduate Program	The effect of surface treatments on the burst rate of drug-delivery contact lenses
Stephen Florczyk – Alfred University Biomedical Engineering Program	Manufacture of nanoparticles from bone
Stefan Habelitz – UC/San Francisco Biomaterials & Restorative Dentistry	Oriented fluorapatite glass-ceramics to study protein-mineral interactions in-vitro using atomic force microscopy
Katrin Höland – University at Buffalo Visiting Scholar from ETH Switzerland	Self-healing concept for the dental bonding interface
Ajay Kashi – Alfred University Biomedical Engineering Program	Surface treatments of dental implants
Ediuska Laurens – University at Buffalo Mechanical Engineering	Mechanical properties of a hydrogel-based prosthetic intervertebral disc
Siddarth Mehta – University at Buffalo Biomaterials Graduate Program	Soft dental acrylics
Saurabh Mittra – University at Buffalo Mechanical Engineering	Infrared microscopic methods used to monitor emissivity across surfaces exposed to different conditions
Ranjani Muralidharan – Univ. at Buffalo Biomaterials Graduate Program	Inhibition of microbial growth by photoactivated materials
Sheela Shrestha – University at Buffalo Biomaterials Graduate Program	Examination of deliberate fracture zones of glass-ceramic dental restorations

The Hulbert Conference: Bioengineering with Glass-Ceramics

Student Registrants

Student Name [Advisor's Name]	University - Program
Tariq Abuhaimed [Dr. Jude Fabiano]	University at Buffalo – Biomaterials
Carrie Buckley [Professor Robert Baier]	University at Buffalo – Biomaterials
Mallika Chary [Professor Robert Baier]	University at Buffalo – Biomaterials
Michael DuVal [Professor Robert Baier]	University at Buffalo – Biomaterials
James Fick [Professor Robert Baier]	University at Buffalo – Biomaterials
Steve Florczyk [Professor Subrata Saha]	Alfred University – Biomedical Engineering
Liam Grover [Professor J.E. Barralet]	University of Birmingham (U.K.)
Katrin Höland [Professor Baier, while in Buffalo]	Swiss Federal Institute of Technology – Chemistry
Karrishma Jumaní [Professor Robert Baier]	University at Buffalo – Biomaterials
Elizabeth Kalisiak [undergrad]	SUNY College at Oswego – Biology
Ajay Kashi [Professor Subrata Saha]	Alfred University – Biomedical Engineering
Maria Koehler [Dr. Ari Sen]	Roswell Park Graduate Division of Univ. Buffalo – Biophysics
Ediuska Laurens [Professor Robert Baier]	University at Buffalo – Mechanical Engineering
Xiurong Li [Dr. John Cowell]	Roswell Park Graduate Division of Univ. Buffalo – Cancer Genetics
Siddarth Mehta [Professor Robert Baier]	University at Buffalo – Biomaterials
Saurabh Mittra [Professor Robert Baier]	University at Buffalo – Mechanical Engineering
Ranjan Muralidharan [Professor Robert Baier]	University at Buffalo – Biomaterials
Hussain Rangwala [Professor Stephen Rudin]	University at Buffalo – Mechanical Engineering
Kuntal Samanta [Dr. Bhattin Koc]	University at Buffalo – Industrial Engineering
Sheela Shrestha [Professor Robert Baier]	University at Buffalo – Biomaterials
Matthew Strom [Professor Marion Olivieri]	D'Youville College – Natural Sciences/Chemistry