William A. Brantley, Ph.D.
Professor

Education

Undergraduate: North Carolina State University, 1963 (Metallurgical Engineering)

Graduate: Carnegie Institute of Technology, 1965 (Metallurgical Engineering); Carnegie-Mellon University, 1968 (Metallurgy and Materials Science)

Professional Experience

US Army Materials and Mechanics Research Center 1968-1970

Bell Laboratories 1970-1974

Marquette University School of Dentistry 1974-1989

The Ohio State University College of Dentistry, 1989-present

Contact Information

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Affiliations

(In addition to BME):

Oral Biology PhD Program, College of Dentistry (Graduate Faculty)

Department of Materials Science and Engineering (Adjunct Professor)

Integrated Biomedical Science Graduate Program (Graduate Faculty)

Lab Members

Dongfa Li, Satish Alapati, Yurdanur Sanli, and Ruohong Liu

Area of expertise

Dental materials science; Principles of materials science; Biocompatibility of dental materials.

Specific areas are: prosthodontic materials, orthodontic materials, endodontic materials, and implant materials.

Research Interests

Present research focuses on dental alloys: palladium-based alloys for metal-ceramic restorations; titanium and titanium alloys for dental restorations, prostheses, and orthodontics; and nickel-titanium alloys for rotary endodontic instruments and orthodontics. The research approach is to investigate relationships between compositions, structures and properties of these alloys, along with novel processing techniques for titanium and titanium alloys. Research tools are scanning electron microscopy, transmission electron microscopy, x-ray diffraction, optical microscopy, differential scanning calorimetry, temperature-modulated DSC, and dynamic mechanical analysis.

Teaching

(1) **Dent 700.08** (AQ 2004 and alternate years) Advanced Dental Materials: Alloys
Course Description The course meets once a week for 3 hours. The format is a combination of lectures, literature reviews and laboratory sessions. The required textbook is: Craig RG, Powers JM (eds). *Restorative Dental Materials* (11th ed). Mosby, St. Louis, 2002. The textbook reference for the nickel-titanium alloys is: Brantley WA, Eliades T (eds). *Orthodontic Materials: Scientific and Clinical Aspects*. Thieme, Stuttgart, 2001, Chap. 4. Textbook chapters are supplemented by a weekly list of assigned articles from the dental and biomedical materials literature. Student evaluation is based upon a final examination (40%), class presentation of assigned articles (40%), and weekly quizzes on the subject matter for the previous class session (20%). Study questions focus on the most important subject matter for the weekly lectures. Each student receives a different take-home final examination.

(2) **Dent 700.02** (WQ 2005 and alternate years) Advanced Orthodontics: Orthodontic Materials
Course Description The course meets once a week for 2 hours. The course is taught from a lecture, literature review, and class discussion approach. Lectures and accompanying PowerPoint slides are based upon the textbook *Orthodontic Materials: Scientific and Clinical Aspects*. Brantley WA, Eliades T (eds). Thieme, Stuttgart/New York (2001). Additional articles are assigned from the orthodontic research literature in weekly reading lists, and students are asked to summarize articles on the reading list with PowerPoint presentations for class sessions. Course evaluation is based on (a) class presentations (50%) and (b) performance on a take-home final examination (50%). Each student receives a different take-home final

examination.

(3) **Dent 884** (Summer Quarter 2004 and occasionally as Program needs arise) Current Issues in Oral Biology: Biocompatibility of Dental Materials
Course Description The class meet once a week for two hours. During the first hour, the faculty instructor for that week presents a lecture on the subject matter, and there is a review of assigned articles from the dental materials science and oral biology literature by students during the second hour. Students are asked to prepare PowerPoint presentations for their reviews, and each student is assigned several reviews. A term paper on a subject to be approved by the Course Director, is also required. There is no final examination. While there is no required textbook for this course, students are given some chapter assignments from textbooks, in addition to the weekly assigned articles. It is expected that students will need to read additional articles to understand the subject matter in the assigned articles. Student evaluation is based upon the term paper (50%) and assigned reviews of articles (50%).

(4) **Dent 884** (Spring Quarter 2003 and occasionally as Program needs arise) Current Issues in Oral Biology: Tissue Engineering
Course Description The course intensively surveys the broad field of tissue engineering as presented in chapters from the major textbook on Tissue Engineering by Lanza, Langer and Vacanti. There is a particular focus on aspects of tissue engineering related to dentistry and oral biology. Students learn the principal aspects of this highly interdisciplinary and very active field of research, which combines cell biology, biochemistry, materials science and chemical engineering, along with basic medical science, to engineer the growth of tissues found in the human body. Each week students are assigned to read approximately 100 pages from the required textbook, and there are supplementary reading assignments from the research literature. Each student is required to give several presentations in the course, accompanied by PowerPoint slides, which summarize the main principles in the assigned chapters and articles. This approach enables students to gain facility with the scientific language used in tissue engineering and to understand the major concepts. In addition to the student summaries, there will be lectures by several faculty on various aspects of tissue engineering. Course evaluation is based upon two components: (a) the seminar presentations and class participation in discussions of the presentations and the weekly subject areas; and (b) a term paper. Each component (a) and (b) is 50% of the course grade. The term paper is to be on some aspect of tissue engineering that is of interest to the student. The topic selected for the term paper must be approved by the instructor.

Recent Publications

Luebke NH, Brantley WA, Alapati SB, Mitchell JC, Lausten LL, Daehn GS. Bending fatigue study of nickel-titanium Gates Glidden drills. *J Endod* 2005;31:523-525.

Yamazaki T, Brantley W, Culbertson B, Seghi R, Schricker S. The measure of wear in *N*-vinyl pyrrolidinone (NVP) modifed glass-ionomer cements. *Polymers Adv Technol* 2005;16:113-116.

Alapati SB, Brantley WA, Svec TA, Powers JM, Nusstein JM, Daehn GS. SEM observations of nickel-titanium rotary endodontic instruments that fractured during clinical use. *J Endod* 2005;31:40-43.

Renick MR, Brantley WA, Beck FM, Vig K, Webb CS. Studies of orthodontic elastomeric modules. Part I. Glass transition temperatures for representative pigmented products in the as-received condition and after orthodontic use. *Am J Orthod Dentofacial Orthop* 2004;126:337-343.

Stavridakis MM, Papazoglou E, Seghi RR, Johnston WM, Brantley WA. Effect of different high-palladium metal-ceramic alloys on the color of opaque and dentin porcelain. *J Prosthet Dent* 2004;92:170-178.

Mallory DC, English JD, Brantley WA, Bussa H, Hutchins M, Kerr S, Powers J. Force-deflection comparisons of superelastic nickel-titanium archwires. *Am J Orthod Dentofacial Orthop* 2004;126:110-112.

Tufekci E, Merrill TE, Pintado MR, Beyer JP, Brantley WA. Enamel loss associated with orthodontic adhesive removal on teeth with white spot lesions: an *in vitro* study. *Am J Orthod Dentofacial Orthop* 2004;125:733-739.

Alapati SB, Brantley WA, Svec TA, Powers JM, Nusstein JM, Daehn GS. Proposed role of embedded dentin chips for the clinical failure of nickel-titanium rotary instruments. *J Endod* 2004;30:339-341.

Iijima M, Brantley WA, Kawashima I, Ohno H, Guo W, Yonekura Y, Mizoguchi I. Micro-X-ray diffraction observation of nickel-titanium orthodontic wires in simulated oral environment. *Biomaterials* 2004;25:171-176.

Alapati SB, Brantley WA, Svec TA, Powers JM, Mitchell JC. SEM observations of new and used nickel-titanium rotary files. *J Endod* 2003;29:667-669.

Brantley WA, Iijima M, Grentzer TH. Temperature-modulated DSC provides new insight about nickel-titanium wire transformations. *Am J Orthod Dentofacial Orthop* 2003;124:387-394.

Guo WH, Brantley WA, Clark WAT, Xiao JZ, Papazoglou E. Transmission electron microscopic studies of deformed high-palladium dental alloys. *Dent Mater* 2003;19:334-340.

Guo WH, Brantley WA, Clark WAT, Monaghan P, Mills MJ. Transmission electron microscopic investigation of a Pd-Ag-In-Sn dental alloy. *Biomaterials* 2003;24:1705-1712.

Recent Presentations

Biocompatibility of dental materials. Oral Biology Seminar, April 2005.

Brantley WA, Iijima M, Kawashima I, Yuasa T, Ohno H, Mizoguchi I. Micro-XRD study of beta-titanium orthodontic wires and soldered joints. International Association for Dental Research, March 2005.

Research on Dental Alloys. Ivoclar Vivadent, Amherst NY. [June 2004]

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