In a series of experiments reported in the May 2006 and January 2007 issues of the Journal of Forensic Science, the researchers show for the first time that inorganic resins that make up the central matrix of tooth-colored dental fillings can withstand temperatures of 1,800 degrees Fahrenheit and can be recovered and named by brand or brand group.

Even when only fragments of resin could be found, the researchers were able to classify the composition of elements in the filling. Comparing those elements and their proportions to the composition of the known filling brands recorded in a deceased’s dental chart could, under the best circumstances, help identify the remains unequivocally.

“By date, no one has recognized that many modern restorative resins have unique characteristics that can be distinguished and used for forensic identification,” notes Bush. “And nobody has applied the standard analytical methods that we have at UB to survey these materials and determine these properties.”

Peter Bush, director of the instrumentation center where much of the research analysis was conducted, was a major contributor to the research, as was forensic dental expert Raymond Miller, DDS, clinical assistant professor of oral diagnostic sciences, and Jennifer Prutsman-Pfeiffer, anthropologist and UB doctoral student.

The team’s work has yielded unexpected rewards. The FBI has offered to include the information in their database, and the American Society of Forensic Odontology has provided a grant to help assemble the data.

“The importance of identifying these properties is, first, to show that it can be done,” says Bush, “and, second, that it can be done even after extreme events such as mass disasters, plane crashes or explosions.”

The 1999 trial of Donald Blom, accused of killing Katie Poirier after abducting her from a Minnesota convenience store, demonstrated the usefulness of such forensic evidence in homicide investigations, as well. Blom confessed to the crime, but later recanted. The body was never found; however, human bone fragments and a single tooth were unearthed in a burn pit on Blom’s vacation property. Analysis of the components of the tooth’s filling material matched the brand of filling recorded in the victim’s dental records, evidence that helped put Blom in prison for life.
After retrieving the resin fragments, the team analyzed their elemental composition using SEM/EDS. In the May 2006 issue of the *Journal of Forensic Science*, they reported that they were able to identify the concentration and microstructure of the inorganic elements in the fragments and link them to the specific brand or brand group of the material documented in the controls. “Not only do these materials have various microstructures,” says Bush, “they also have unique elemental compositions, which make it possible to distinguish between brand or brand groups. We showed that the elemental distinction remains even after extreme conditions such as cremation.”

To create a true-to-life scenario, the team worked next with cadavers donated to the medical school’s Anatomical Gift Program, with full approval from the university’s Human Subjects Review Board. They removed all existing resin fillings from the teeth of six cadavers and replaced them with a total of 70 fillings representing five different resin brands. The filling brands used were recorded in each cadaver’s dental record. With the new fillings in place, the bodies were put through the standard two-step cremation process: very high heat (1,800 degrees Fahrenheit) for two hours and a half hours, which destroys all flesh and small bones, then crushed in a grinder and reduced to ashes.

Bush and colleagues were able to find and identify enough of the resins to make a positive identification of each cadaver, using the portable XRF unit to mimic investigations that need to be conducted in the field. The results of this study appeared in the online version of the *Journal of Forensic Science* in December 2006 and were published in the January 2007 print issue. “Even in the ashes, we were able to retrieve small pieces of resin and distinguish between cadavers,” reports Bush. “To my knowledge, this is the first time this type of analysis has been done. This study provides hope of identification when little hope may be present.”

“If an individual isn’t burned to this extreme and the teeth are intact but the dental X-ray comparison is questionable or teeth are fragmented, this type of analysis can give another level of certainty on which to base an identification,” she says. XRF doesn’t provide as much information as the lab-based SEM/EDS equipment, Bush adds, but its speed compensates for lack of precision. The device can identify the chemical spectrum of elements in inorganic material in 6 to 10 seconds, providing quick on-site screening of suspected material. The ability to distinguish between resins gives investigators a new tool for use in special circumstances, Bush concludes.

“Retrieving small amounts of resin as we did in this study would not carry as much weight for identification as a dental chart comparison, but the evidence was indisputable and unequivocal. This evidence would serve as an aid in identification when very little other evidence exists or when added scientific corroborations are needed.”

Bush and her coinvestigators are currently working with the FBI to construct a database of the most common brands of dental restoration materials and their elemental composition for use in criminal investigations. “There are more than 50 filling materials on the market today,” explains Bush. “We have analyzed the 30 most popular resins and 23 historical resins dating back to 1971. There are also many other unique dental materials—posts, cements, crowns, sealers—which also will be included in our database. Again, no one else has attempted such a comprehensive survey of their properties.” The database does have limitations: It will be useful only if dentists document all dental restorations, including brand names, in their dental records, notes Bush.

The team’s work has yielded unexpected rewards. The FBI has offered to include the information in their database, and the American Society of Forensic Odontology has provided a grant to help assemble the data.

The UB researchers will have a role in bringing that point home to their colleagues and dentists-of-tomorrow through the new Laboratory for Forensic Odontology, housed in the UB School of Dental Medicine. Bush will direct the laboratory, with Miller as codirector. The laboratory will host demonstrations and seminars on forensic dentistry for students and feature lectures and continuing education programs in forensics for practicing dentists.

Phillips Lytle understands that health care providers face unique legal challenges. HIPAA, STARK, compliance issues, DOH regulations, reimbursement, the OPMC, and let’s not forget about MFCC audits. These are all hot topics that we are prepared to help you with. Have questions or concerns? Call or e-mail Lisa McDougall, Esq., the health care practice group coordinator, at (716) 847-5478 or lmc doug all@phil lipslyt le.com.
A dinner in her honor, hosted by the School of Medicine and Biomedical Sciences and the Medical Alumni Association (MAA), was held October 27, 2006, at the Buffalo Club. In attendance were MAA officers and other alumni, Dean Michael Cain, MD, faculty and friends of Olmsted Ross.

Olmsted Ross was one of four women in a class of 64 to receive her medical degree in 1939. While still in medical school, she began flying planes as a hobby, becoming one of the first female pilots in Western New York. During World War II, she served as a medical officer and flight instructor, obtaining the rank of lieutenant in the Civil Air Patrol and serving as a member of the Ninety-Nines, the international organization of female pilots.

As an intern, she pursued a career in aviation medicine, which changed with the start of World War II, as hospitals needed women to fill the vacancies created by male physicians drafted into war. Olmsted Ross completed her residency training in Chicago at the Illinois Eye and Ear Infirmary.

Olmsted Ross was the youngest person on record to be named a diplomate of the American Board of Ophthalmology. As the first female ophthalmologist in Buffalo, she opened a private practice in 1944. Soon she was subcontracting with various local industries, beginning a long career of patient care, advocacy and research. Olmsted Ross initiated safety goggle programs and industrial lighting standards at Curtiss Wright Corporation. While working to fit engineers with protective eyewear at Cornell Aeronautical Laboratory, she listened to their concerns about working with a new technology called radar. She spent the next three years investigating the ocular effects of radar exposure and related issues with studies conducted at Tufts University, Griffiths Air Force Base, Cape Canaveral and aboard the RCA radar ship patrolling the East Coast.

During the 1950s and 1960s, Olmsted Ross established an accredited ophthalmology program at Deaconess Hospital, which involved the relocation of the Wetlaufer Clinic—the largest eye clinic in the city—to the hospital. She was chair of the Wetlaufer board and created the preschool vision screening clinic in Buffalo public schools by training Junior League volunteers to conduct eye exams. Additionally, she developed and introduced large-print books to area libraries.

Olmsted Ross has been associated with the Blind Association of Western New York since she began her practice. In 1999, she made the agency a gift of $1 million to renovate the facility, the largest gift ever made by an individual to the agency, which now bears her name: The Elizabeth Pierce Olmsted, M.D. Center for the Visually Impaired. People from around the world come to participate in the services provided, to obtain training and job skills and to learn solutions to the challenges they face living with impaired vision.

In the fall of 2003, Olmsted Ross offered a $3 million challenge grant to UB to establish the Ira G. Ross Eye Institute, the research and teaching affiliate of the center named in honor of her late husband; upon its successful conclusion, she made an additional $1 million challenge grant. The institute will be an important element of the Buffalo Niagara Medical Campus, a world-class facility located in downtown Buffalo (see related story on page 40).

A recipient of many awards for career accomplishments, Olmsted Ross was inducted into the Western New York Women’s Hall of Fame in 2002 and received UB’s prestigious Samuel F. Capen Award in 2005 for “meritorious contributions to the University at Buffalo.”

—Kathleen Water

Changes in Residency Programs

In September 2006, University at Buffalo announced significant changes in two of the 64 residency training programs that it operates jointly with area hospitals.

The formerly suspended training program in otolaryngology is being reestablished, and the residency in radiology will be closed.