

Abstract:

“The Interaction of Human Cells with Orthopaedic Prosthetic Metal Alloys: Current and Novel Materials”

Each year in the United States over 500,000 hip and knee replacement surgeries are performed, proving it to be an effective and reproducible success of modern medicine. Despite this resounding clinical success, the frequently detrimental biological response, known as aseptic loosening, continues to plague total joint recipients and accounts for the majority of implant failures. During this presentation we will describe how wear debris, predominantly fine metal wear particulates, inevitably produced during normal wear by mechanical articulation, stimulate a complex biochemical signaling cascade that result in bone resorption adjacent the implant.

Improved quality of life issues and a greater functional demand of current joint prostheses have necessitated improved implant design and biomaterials. During this presentation we will also describe metal alloys traditionally used in prosthetics (titanium& cobalt-chromium) and novel metal alloys (zirconium) that have recently entered the market.

Speaker Biographies:

Mark W. Kovacic, B.S.

Mark received his B.S. in Biology, with a strong emphasis in Medical Technology, from The University of Akron. For 24 years he has been employed as the staff Biologist for the Walter A. Hoyt, Jr. Musculoskeletal Research Laboratory, Department of Orthopaedic Surgery, at Summa Health System Hospitals. Mark is currently interested in the synovial response to particulate wear debris-induced osteolysis following total joint replacement. He is nationally known for his expertise in the analysis of synovial fluid from both normal and pathological total knee joints, and has developed a considerable list of refereed journal papers.

Rex D. Ramsier, Ph.D.

Rex received his B.S. and M.S. in Physics from The University of Akron, and his Ph.D. in Physics from the University of Pittsburgh. After about two years working as a senior scientist at Westinghouse, he returned to The University of Akron as an Assistant Professor. Currently, he is a Professor of Physics and Chemistry, and has won both the University-wide Outstanding Teacher (2001) and Outstanding Researcher (2005) awards. Rex is currently the Chair of the Ohio Chapter of the AVS, is the coauthor of about 100 peer-reviewed publications, and currently has funding from NIH and NSF. The research interests in Rex's group revolve around the surface science and characterization of materials for energy conversion and biomedical applications. He and his students use a variety of surface and bulk spectroscopic methods to characterize materials, including electron, photon, and ion-based techniques.

Abstract:**“The Basics of Particle Analysis”**

In particle analysis we must be able to separate by graylevel features that are of interest from areas that are not of interest to us. The features that are of interest to us are commonly characterized as particles or inclusions. The particle size and shape can be characterized and the particle chemistry is collected in an automated mode by EDS techniques. There are many difficulties in obtaining accurate chemistry from particles but our primary goal is to sort the particles into phases of some kind (e.g. “stainless steel with Ni” versus a “stainless steel without Ni”). Typically, the BSE image is thresholded to provide us with the particles or features to be analyzed. The threshold levels that will be used should be standardized or calibrated with a known material. This will ensure the most consistent, reproducible results.

Speaker Biography:

Bob Anderhalt received his undergraduate and graduate degrees from UCLA in Geology. He has taught Geology at Bowling Green State University and was the SEM Applications Engineer for Philips Electronic Instruments in Mahwah, NJ. He is currently the Applications Lab Manager for EDAX Inc. in Mahwah, NJ.