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TITANIUM IN MEDICINE PANEL PRESENTATIONS (PART II)

Leading-edge developments for the use of titanium in medical applications, representing programs in the United States and Europe, will be presented at TITANIUM 2010, the 26th annual international conference and exhibition, which will be held Oct. 3-6 at the Gaylord Palms Hotel and Convention Center, Kissimmee, FL.

Titanium is a well-established material of choice for demanding medical applications such as replacement joints, bone screws and plates, dental implants and surgical components due to its biocompatibility, resistance to attack by body fluids, high fatigue strength and low modulus.

Rahul Bhola, a research assistant representing the Department of Metallurgical and Materials Engineering, Colorado School of Mines, Golden, CO, will discuss the study of modification of oxides formed on titanium beta alloys by calcium and phosphorous to enhance osteo-integration for implant applications.

According to an abstract of his presentation, the study explores the possibility of calcium and phosphorous ion implantation into the oxide films formed on two beta titanium alloys--Ti-15Mo and Ti-45Nb--during oxide film growth and aging. Potentiodynamic polarization method was used to grow oxide films on these alloys up to a final potential of 5V vs. SCE, following which the oxide films formed were allowed to age potentiostatically at the final potential until the current became stationary. The alloys anodized in these solutions were studied for their electrochemical behavior in Hanks Balanced Salt Solution (HBSS) using electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization.

Interviewed recently, Bhola said the study began year ago and is ongoing, with various types of modified implants undergoing research trials. Citing potential benefits for modified medical implants, he said that since the titanium beta alloys possess low modulus of elasticity and better cellular attachment properties, they have potential applications as new biomaterials for all types of implant systems. "The enhancement comes from a point of mechanical to mechano-chemical retention of implant into the bone and can help patients achieve a faster, healthier and more stable implant fixation into human tissues."

Real-world applications include osteo-integration titanium implants for trauma and bone fractures, as well as a variety of implants such as endo-osseous screw-shaped dental implants, anchor screws, hip joints, knee joints and long-bone stems, Bhola said.

François Ory, president of Forécreu SA, will discuss the "art" of processing titanium alloys into cannulated bars for trauma applications. Based in Chemin de Saint Amand, France, Forécreu

designs, manufactures and markets hollow-round titanium and special steel bars for surgical tools and implants. Ory will focus on how to achieve the required dimensional features and mechanical characteristics specified by the medical industry for trauma applications.

Ory's presentation will describe proprietary aspects of Forécreu's production system, including extrusion and bar drawing and improvements in process control. Ory also will address design and marketing issues, such as the emerging application areas for cannulated-bar technology in orthopedics; the preferred metallurgical properties of titanium alloys used for medical implants; and time-to-market economics that involve vendors, original equipment manufacturers and end users operating in the medical sector.

Ulf Ackelid, Ph.D., senior scientist, powders and materials, at Arcam AB, Molndal, Sweden, will review improved production rates in additive manufacturing with its Electron Beam Melting (EBM®) MultiBeam technology. Arcam's EBM technology builds fully dense metal parts, layer by layer, from metal powder using an electron beam. Parts are built in a vacuum chamber by additive consolidation of thin layers of metal powder. The EBM technology provides expanded freedom in design of complex, three-dimensional geometries, such as fine-network structures, internal cavities and channels. The EBM production route delivers full traceability from ingot to the final part, complying with the industry-driven standards for medical.

Arcam's recent release of control software provides enhanced build-speed and surface-finish properties, making it possible to maintain several melt pools simultaneously. The feature, named Multibeam, can boost production rates by 30 percent or more, according to Ackelid.

The International Titanium Association (ITA), based in Broomfield, CO, serves as the host and sponsor of TITANIUM 2010, which is designed to suit the needs of titanium producers, suppliers, customers and stakeholders. Jennifer Simpson is the executive director of the ITA (Web site www.titanium.org). Call (303) 404-2221 for more information on the conference.

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