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Elaboration of Ti based biocompatible alloys using Nb, Fe and Zr as alloying elements

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Increasing biocompatibility of implant materials is an important factor in developing better and long-lasting implants that function in a very close manner to actual tissue and bone. Various alloys have been used due to their biocompatibility, such as: stainless steels, titanium based alloys and nickel or cobalt alloys. Depending on the alloying elements used it is possible to modify the material properties to fit into various niches of use such as pacemaker devices, stents, biosensors, dental or bone implants and others. Some alloying elements show higher biocompatibility than others and the commonly used alloys include elements that can be detrimental to human health such as Nickel, Vanadium and Cobalt. Using materials such as Nb, Fe and Zr in order to replace the commonly used metals reduces the risks of accumulation of various substances that can damage tissue and lead to health complications. The proposed alloys are elaborated in a Five Celles levitation melting furnace under argon atmosphere in order to create a more homogeneous material with reduced defects and inclusions. The cast alloys are then analyzed through modern methods such as SEM, XRD, EDS and their mechanical properties such as hardness and strength and these properties are compared to that of bone in order to determine mechanical reliability.

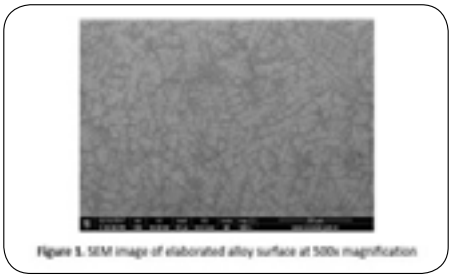

Figure 1. SEM image of elaborated alloy surface at 500x magnification

Recent Publications

1. Bang, I.-H., S.-Y. Cho, M. Pantilimon and S.-J. Lee (2018). "NO2 Gas Sensing Properties of Nano-Sized WO3 Powders Prepared by a Polyvinyl Alcohol Solution Route." Journal of Nanoscience and Nanotechnology 18(3): 2185-2188.
2. Matei, E., A. Predescu, C. Drăgan, C. Pantilimon and C. Predescu (2017). "Characterization of Magnetic Nanoiron Oxides for the Removal of Metal Ions from Aqueous Solution." Analytical Letters 50(17): 2822-2838.
3. Matei, E., M. Rapa, A. A. Andras, A. M. Predescu, C. Pantilimon, A. Pica and C. Predescu (2017). "Recycled Polypropylene Improved with Thermoplastic Elastomers." International Journal of Polymer Science 2017: 10.
4. Pantilimon, M. C., T.-S. Kang and S.-J. Lee (2017). "Synthesis of Nano-Sized Tungsten Oxide (WO3) Powder by a Polymer Solution Route." Science of Advanced Materials 9(2): 280-284.
5. Pantilimon, M. C., T. S. Kang and S.-J. Lee (2016). "Synthesis of nano-sized indium oxide (In2O3) powder by a polymer solution route." Ceramics International 42(3): 3762-3768.

Biography

Cristian Pantilimon is an environmental and materials science engineer with an aim at research that can be introduced into the industrial sector. He has followed training and education during his undergraduate and graduate studies in foreign countries such as Italy and South Korea. The focus of his research is to develop better materials that can be used by the populace and that can have a very low impact on the wellbeing of both humanity and the environment.

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