

Analysis of Biocompatible Metallic Materials used in Medicine

Žaneta Gerháťová, Jozef Paták, Paulína Babincová, Mária Hudáková, and Marián Palcut

*Faculty of Materials Science and Technology in Trnava, Slovak University of Tech,
Jána Bottu 25, Trnava, Slovakia*

The paper presents the results of the analysis of two biocompatible materials, Kirschner wires of different thicknesses. Scanning electron microscopy and light microscopy were used to document the microstructure. Before observation, the wires were prepared by a standard metallographic procedure (grinding and polishing) followed by electrolytic etching. The chemical composition was determined by studying the wires using quantitative energy-dispersive X-ray spectrometry. It has been found that the chemical composition of the materials corresponds to Cr-Ni stainless steel. In the thick Kirschner wire (sample no. 1) a deformed microstructure after drawing was observed. Sample no. 2 (thin Kirschner wire), on the other hand, consisted of polyhedral austenitic grains, which were formed after recrystallization annealing. Furthermore, isolated microparticles were observed and assigned to titanium nitride. A Vickers hardness test was also performed on the samples. It has been found that the microhardness of sample no. 1 was 428.8 HV 0.5. The average microhardness of sample no. 2 was 213.4 HV 0.5. It can be concluded that recrystallization annealing decreases the hardness of the material.

Keywords: biocompatible material, austenitic stainless steel, Kirschner wire, Vickers hardness test.

This work was supported by the Slovak Research and Development Agency (project no. APVV-20-0124) and the VEGA Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic (project no. 1/0692/22).