

Dental implantology is a branch, which has started a rapid evolution over the last years. All of the experts dealing with implantation are focused on extending indications for the application of the used materials to reduce the time period of therapy. Coating of the implants is a possible way how to treat patients in a shorter time period with the similar results as following the classical Brånemark protocol. Hydroxyapatite is one of the most attractive materials for human hard tissue implants because of its close resemblance to the bone and the teeth. Its positive influence on the healing process called osseointegration is obvious. Hydroxyapatite is of a brittle nature and limits the applications as the main solid material for the dental implants. Zirconia ceramics have several advantages such as the high strength and it is frequently used to reinforce other ceramics. The concept of adding zirconia as the second phase to hydroxyapatite significantly increased the bonding strength. In the dissertation pulsed laser deposition is shown as one of the coating method. The bioceramic zirconia samples were characterized by methods for thin solid film analysis such as X-ray diffraction, morphology investigation by electron microscope and measurement of the film thickness. Afterwards we examined the mechanical properties of titanium alloy samples with the buffer layer from zirconia and the coating from hydroxyapatite. We measured crystallinity, morphology characteristics, wettability and Ca/P ratio of the hydroxyapatite layer. The methods used for physical evaluation were electron microscopy, X-ray diffraction, goniometric measurement of contact angle and wavelength dispersive X-ray analysis. The physical tests summarized good mechanical properties and a satisfactory adhesion to a titanium core modified with zirconia and hydroxyapatite. Pulsed laser deposition was found to be a promising method of applying thin films to a metal core for dental implants.