Abstract

We report on preparation, structural parameters, biocompatibility and modification of the hybrid systems prepared by transitional metals (Ni, Co, Ti, etc.) and fullerenes (C60). The thin film composites were prepared by co-evaporation or alternating deposition of fullerenes and metallic components at different deposition kinetics. It resulted in a broad variety of nano-structures with different properties. The hybrid systems were exposed to post-deposition annealing or laser illumination that resulted in phase separation of the immiscible fullerene and metallic phases. The modifications of the hybrid structures were monitored by relevant analytical techniques (e.g., Raman Spectroscopy, Scanning Electron Microscopy, Rutherford Backscattering, etc.), the biocompatibility was examined using the human osteoblast-like MG 63 cell culture. The obtained results show that the metal-fullerene hybrid films exhibit interesting properties and post-deposition behavior. The films can acquire various nano-structures often with periodic patterns, at elevated temperatures they can undergo dramatic phase transformation with a tendency to create self-arranged nano-objects, and under laser beam illumination laser-induced-periodic-surface-structures (LIPSS) could be synthesized. The study of biocompatibility showed that the hybrid mixture systems can be used as good templates for directed cell adhesion, growth and viability to a similar extent as standard tissue culture substrates.

Keywords: Transitional metals, fullerenes, selforganization, biocompatibility