

Structure and Application of Organic-Inorganic Biomaterials on the Base of Natural Polymers and Silica

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The sol-gel method has definitely proved its exceptional perspective of the possibility to synthesize a significant number of new materials with specific properties. Organic-inorganic hybrids are a relatively new type of composites with interesting mechanical, optical, structural and thermal properties [1]. Natural polymers offer the advantage of being very similar, often identical, to macromolecular substances which the biological environment is prepared to recognize and to deal with metabolically [2].

The aim of the present study is to develop of new organic-inorganic biomaterials. Sol-gel method was used to synthesize biomaterials containing tetraethoxysilane, methyltriethoxysilane and ethyltriethoxysilane as a source of silica and water soluble polymers as pectin from apple and methylcellulose. The biomaterials have been obtained as the quantities of the polymers have varied from 5 to 50 wt% to SiO₂.

The structural evolutions of prepared biomaterials have been investigated by X-Ray diffraction, Fourier transform infrared spectroscopy, BET and Atomic Force Microscopy. XRD patterns showed that all samples are in an amorphous state. IR spectra of prepared sol-gel organic-inorganic materials indicate characteristic peaks of polymers and silica network. Observed structure by AFM showed surface with random distributed aggregates. The size of aggregates varied in large range and depends of type of the natural polymers and silica source.

The application of obtained organic-inorganic materials were applied as matrices for immobilization of yeast cell *Trichosporon cutaneum* starin R 57. Obtained biofilms were used as a sorbents of heavy metals ions from polluted waters.

References

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2. J. Ge, D. Lu, Z. Liu and Z. Liu, *Biochem. Eng. J.* 44 (2009) 53.