Surface analysis of zeolites with a hydroxyapatite layer for potential dental application

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LTA type zeolites show properties that determine the potential usefulness of these aluminosilicates in biomedical applications, i.e. they are non-toxic, harmless and possess antibacterial activity [1-2]. In addition, the aluminosilicates from this group show the highest ion exchange capacity among all zeolites [3-4]. Due to this property, it is possible to incorporate calcium ions in their structure. Calcium ions released into the oral cavity from external sources are able to rebuild the hydroxyapatite structure of the enamel [5]. LTA type materials containing calcium ions represent an interesting alternative to currently used fillers for dental composites which are applied for the reconstruction of hard dental tissues (enamel and dentin). The second interesting type of a filler for dental applications is a zeolite filler with a hydroxyapatite layer. It is assumed that the combination of calcium zeolite and hydroxyapatite (which is the main inorganic component of teeth and bones) in dental filling may contribute to the increase of its remineralisation potential. Research on this type of materials, containing zeolites with hydroxyapatite, are currently conducted mainly in the field of tissue engineering and focuses on the reconstruction of bone tissue [6,7].

The analysis of surface chemistry is a very important part during the synthesis of materials for the intended application. LTA type calcium zeolites with a mineralized hydroxyapatite layer was obtained. The efficiency of the synthesis and the formation of the hydroxyapatite layer was investigated by means of spectroscopic, microscopic and adsorption methods.

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