RECEPTOR PROPERTIES OF NANOPOROUS MATERIAL BASED ON OLIGOPEPTIDES TOWARD VAPOR OF ORGANIC COMPOUNDS AND WATER

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The research on, and development of, oligopeptide based porous materials has become one of major areas in material science, supramolecular chemistry, and crystal engineering.

In this work the receptor properties of the oligopeptides $_L$-alanyl–$_L$-valine $_L$-valyl–$_L$-alanine and $_L$-leucyl-$_L$-leucyl-$_L$-leucine toward vapors of organic compounds and water were studied using quartz crystal microbalance. The reversibility of sorbate binding was studied by simultaneous thermogravimetry and differential scanning calorimetry combined with mass-spectrometry of evolved vapors. The surface morphology of thin films of oligopeptides before and after interaction with the sorbate was studied by atomic force microscopy.

It was found that sorption capacity of oligopeptides decrease with the increase of molecular size of organic sorbates. It was observed that binding of methanol and nitromethane by dipeptides $_L$-valyl–$_L$-alanine and $_L$-alanyl–$_L$-valine does not change the surface morphology of the dipeptides.. The binding of toluene and pyridine by thin layer of $_L$-valyl–$_L$-alanine gives the formation of the stable nanosized islands on the initially flat dipeptide surface. In cases the changing of the dipeptides surface morphology sensors lost their receptor properties.

It was found that tripeptide crystallizes from a solution of methanol with formation thin film which covered with micro and nanocrystals. It was observed that sorption of organic compounds that are capable to effectively binding with tripeptide leads to deformation of crystals of $_L$-leucyl-$_L$-leucyl-$_L$-leucine even to complete destruction. In general, the results obtained in the present study are useful to predict the effect of vapors on the morphology of crystalline oligopeptides on nanoscale level.

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