PII-77. Receptor properties of nanoporous material based on oligopeptides toward vapor of organic compounds

Efimova I.G.[1], *Ziganshin M.A.*[1], *Gorbatchuk V.V.*[1], *Ziganshina S.A.*[2], *Chuklanov A.P.*[2], *Bukharaev A.A.*[2]

1 - A.M. Butlerov Institute of Chemistry. KFU
2 - Zavoisky Physical–Technical Institute

iefimova@ksu.ru

The research on, and development of, oligopeptides based microporous materials have become one of major areas in material science, supramolecular chemistry, and crystal engineering.

In present work, sorption capacity of the oligopeptides $_L$-alanyl–$_L$-valine, $_L$-valyl–$_L$-alanine and $_L$-leucyl-$_L$-leucyl-$_L$-leucine towards organic guest was determined using quartz crystal microbalance (QCM) technique. A specific change of surface morphology of oligoipeptides treated with vapors of various organic guests was observed by atomic force microscopy (AFM). The thermal stability of the inclusion compounds was studied by simultaneous thermogravimetry and differential scanning calorimetry combined with mass-spectrometry of evolved vapors (TG/DSC/MS).

The "structure-properties" relationships for the molecular recognition of organic compounds by oligopeptide layers were determined.

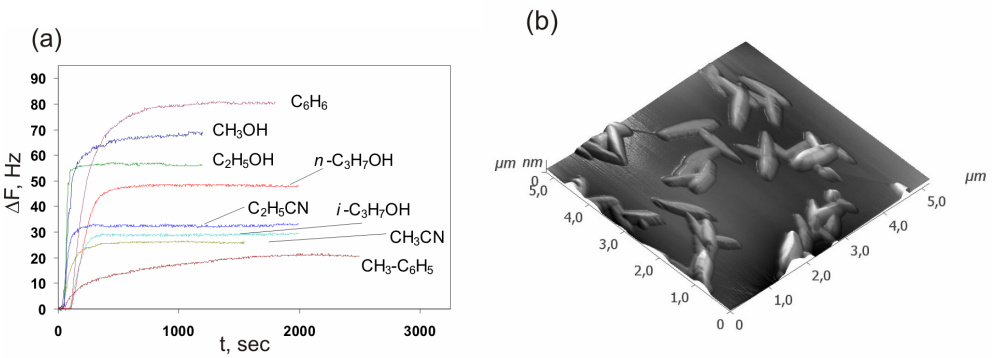

Figure 1. (a) Response of QCM sensor coated with dipeptide $_L$-valyl–$_L$-alanine to some organic vapors; (b) AFM image of the $_L$-valyl–$_L$-alanine film after the binding of pyridine vapor and further dried with hot air.

It was found that sorption of a relatively large and/or hydrophobic molecules is caused by an irreversible change in surface morphology of the film oligopeptides, with the formation of nanoislands with varying topology (Fig.1b).

The geometry of the nanosized islands on the oligopeptides surface was quantitatively characterized. The average size and height of nanoislands, size distribution, and roughness of the surface were determined.

It was shown that micro- and nanocrystals formed on the surface of the thin film tripeptide $_{L}$-leucyl-$_{L}$-leucyl-$_{L}$-leucine prepared from solution in methanol. It was found that the sorption of organic compounds, which are able to effective binding with the tripeptide, leads to a significant deformation of $_{L}$-leucyl-$_{L}$-leucyl-$_{L}$-leucine microcrystals on the surface of thin film.

The possibility of using the dipeptide as a working material for gravity sensors used in expert systems for recognition the smell and taste (electronic nose and electronic tongue) are shown.

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