



Thermal Stability, Sorption Properties and Morphology of Films of Dipeptide and Tripeptide Based on α -Glycine

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ABSTRACT

The effect of the number of amino acid residues in α -glycyl- α -glycine and α -glycyl- α -glycyl- α -glycine on thermal stability of powders, the sorption properties and surface morphology of thin films has been found. Dipeptide forms the film coated with disk-shaped nano-objects on the hydrophilic substrate, while tripeptide self-organizes to the film coated with nano-crystals on the hydrophobic substrate. Replacement of substrates (hydrophilic \leftrightarrow hydrophobic) leads to the formation of smooth films of studied oligopeptides. Powders of oligopeptides do not form stable clathrates with water and organic compounds at room temperature. But their thin films are capable to bind organic or water vapors with high thermodynamic activity. Surprising difference in sorption selectivity of dipeptide and tripeptide has been observed. α -Glycyl- α -glycine predominantly binds organic H-donors, while α -glycyl- α -glycyl- α -glycine is more selective to H-acceptors.

Key words: Oligopeptides, Morphology of film, Sorption, Thermal stability, Nanostructures.

INTRODUCTION

As a consequence of self-organization the short-chain oligopeptides are capable to form the materials based on well-arranged nanostructures, such as nanotubes^{1,2}, nanofibers³, nanorods^{4,5}, nanowires⁶, nanoparticles⁷, nanospheres^{5,8}. Such materials are biocompatible⁹ and used for the fabrication of sensitive sensors^{9,10}, for preparation

of hybrid materials^{11,12}, as well as new sorbents, which capable to bind gases^{13,14}, bioactive substances¹⁵ and enantiomers^{16,17}. Such possibilities of their practical usage in modern technologies caused the significant interests for oligopeptides in recent times^{18,19}.

The study of self-organization of oligopeptides permitted us to establish that the form