BOND ENERGY IN NANOSTRUCTURED WATER

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Monitoring of loss tangent is shown to be a sensitive method allowing control of energy bonds between molecular species in water.

Keywords: water nanocluster, bond energy, loss tangent.

1. Introduction

Water is one of the most important liquids used in modern micro- and nanoelectronics technology. This paper discusses one possible method for monitoring the properties of water.

Authors[1,2] have shown that both the electrophysical and physico-biological properties of the resulting aqueous solutions vary significantly depending on the initial water structuring connected with an intermolecular interaction in it. Today, there are some basic ideas about the water structurization. Specific nanoclusters including $100 - 500$ H_2O molecules are supposed to be formed in water.[3,4] According to another estimation[1] the similar nanoclusters can consist of up to 910 molecules. In both cases, the nanocluster size is estimated to be about 1.5 nm.

The basis for the cluster construction is a tetragonal cell, at the vertices of which water molecules linked by the hydrogen bonds are located. However, it is important to know which part of the total number of the molecules is included in these nanoclusters, and which part remains free in the form of H_2O dipoles.

Note that even in pure water, OH^- anions and H^+ cations are formed as a result of the dissociation process. An attachment of these ions to water molecules via ion-dipole interaction is inevitable. It is clear that such interactions can be characterized by specific bond energies representing all varieties of the nanostructures formed.

This paper demonstrates a simple and effective technique for numerical estimation of the bond energy in water clusters using the measurements of the loss tangent of water. Experimentally obtained particular bond energy in deionized water is presented.

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