

Peculiarities of interaction of amino acids with Nafion EZ depending on isotopic composition of liquid matrix

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In photoluminescence spectroscopy experiments, the interaction mode of the polymer membrane Nafion with various amino-acids was studied. The experiments were performed with physiological NaCl solutions prepared in an ordinary water (the deuterium content is 157 ppm) and in deuterium-depleted water (DDW, the deuterium content is 1 ppm). It turned out that the EZ size in DDW is much smaller than that in ordinary water. The effects of quenching luminescence by amino-acids should be taken into account. It is shown that the dynamic of Nafion membrane swelling and luminescence quenching by amino-acids are different for physiological solutions prepared in ordinary water and DDW. The stationary luminescence intensity level for ordinary water is substantially higher than that for DDW, which is due to the protective function of the EZ in ordinary water. If Nafion is subject to prolonged soaking in a glutamic acid suspension, the luminescence from the EZ is suppressed, but adding a small amount of a lysine suspension to the liquid results in an abrupt increase in the luminescence intensity. The value of this increase depends on the lysine concentration and the deuterium content in the suspension. The effects of quenching/recovering the luminescence from the EZ due to the addition of various amino acids can be used to create logical binary gates based on Nafion EZ and amino-acid suspensions.