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Effect of flavin mononucleotide on the texture of BSA films

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In this study, we have investigated the influence of flavin mono nucleotide (FMN) on BSA film textures. The effect of FMN on BSA in solution was studied by UV and fluorescence spectroscopy, and by dielectric permittivity measurements. The films and spectra were obtained for the concentrations 0.5 mg/ml of BSA, 20 mM of NaCl, and 0.01 to 3 mM of FMN. The dielectric measurements were carried out at concentrations 5 mg/ml of BSA, 200 mM of NaCl, and 30 mM of FMN.

At low concentrations of FMN (0.01 – 0.3 mM), the UV absorption of BSA+FMN is greater than that of FMN, and at high concentrations of FMN (1 – 3 mM) it is smaller. The fluorescence of BSA+FMN at BSA peak wavelength (242 nm) decreases with the increase in FMN concentration; FMN does not fluoresce in this area. According to the microwave dielectrometry studies, the dielectric constant ϵ' of the BSA+NaCl+FMN solution is lower than the expected value. This may be explained by the fact that, when adding BSA to a FMN solution, additional water binding takes place – likely as a result of the formation of additional binding sites in BSA. The median length L of Z-structures on the film surface varies with the concentration of FMN as $L = 11$ nm at 0.01 mM, $L = 2$ nm at 0.03 mM, $L = 3$ nm at 0.1 mM and $L = 0$ nm at 0.3 mM. It can be assumed that the NH group in the imidazole ring of tryptophan interacts with the two carbonyl groups of FMN, with an inductive resonance energy transfer between FMN and tryptophan. This interaction might be a result of the changes in the protein conformation.