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Glucose/galactose binding protein changes its mechanical properties: Novel AFM method of detection in-situ. VENKATESH SUBBA RAO, LINDA LUCK, IGOR SOKOLOV, Clarkson University — Recently a periplasmic glucose/galactose binding protein, GGRQ26C, immobilized on gold surface has been used as an active part of a glucose biosensor based on quartz microbalance technique (QCM). However the nature of the glucose detection was not clear. Here we have found that the receptor protein film immobilized on the gold surface increases its rigidity when glucose is added, which explains the unexpected detection signal. To study the rigidity change, we developed a new fast and simple method based on using atomic force microscopy (AFM) in tapping mode. The method was verified by explicit measurements of the Young's modulus of the protein film by conventional AFM methods. Since there are a host of receptors that undergo structural change when activated by ligand, AFM can play a key role in the development and/or optimization of biosensors based on rigidity changes in biomolecules. From fundamental point of view, the developed method can be used for study of mechanics of proteins in different environments. This can be compared with molecular simulations to get additional information about the protein structure.

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