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RECENT ADVANCES IN PROTEOTRONICS, THE SCIENCE OF PROTEIN-BASED ELECTRONIC DEVICES

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We investigate relevant electrical properties of several biomolecules like transmembrane proteins (opsins, olfactory receptors, etc) and DNA/RNA fragments (aptamers) which are of interest for the realization of a new generation of nanobiosensors. The investigation compares existing experiments, as obtained by the atomic force microscopic (AFM) shown in the figure, with the theoretical expectations obtained from an impedance network protein analogue, recently developed by the Lecce team. The changes in the electrical response due to the sensing action of the selected biomolecules are correlated with the conformational change undergone by them. The satisfactory agreement between theory and experiments points to a promising development of a new class of nanobiosensors based on the electrical properties of sensing proteins and aptamers.

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