Current Topics in Biophysics Vol 26(1), 2002

Application of the electron paramagnetic resonance spectroscopy to modern biotechnology

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The presentations of the 5th Workshop on EPR Application in Biology and Medicine, as well as selected papers, in which the EPR (electron paramagnetic resonance) spectroscopy technique played a significant role, are reviewed from the point of view of potential biotechnological applications. Selectivity, specificity, non-invasiveness, and other features of the technique make it particularly well suited to meet the high requirements of a tool appropriate for biotechnological research. Several examples of work in molecular biology are summarized, showing that at all levels of genetic information expression, from DNA and RNA to proteome, in all aspects of cellular phenotype, including membranes and sugar residues, EPR is being effectively used to reveal both structural and functional information. Furthermore, in medical biotechnology, EPR is of crucial importance not only in oxidative stress research, but also in the action and transport of drugs, and in medical imaging. Finally, biotechnology in the classical meaning of the term employs EPR in such areas as plant biotechnology and food production and storage, including such a traditional product as beer. Overall, the wide spectrum of presented data demonstrates impressive versatility and extensive usage of EPR in biotechnology, deserving attention of biotechnologists.