

Are dispersions in dielectrophoretic and electrorotational cell spectra in the 10 kHz region related to protein properties?

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Abstract: *Electrical methods offer the possibility of very sensitive measurements of ionic currents. DC measurements of electric properties of proteins have attained high sensitivity (patch clamp), but AC measurements are very rare. Dielectric properties of single cells can be measured either by dielectrophoresis (DP) or electrorotation (ER) over a wide frequency range. When DP and ER data of different cell species were compared on the basis of the single-shell model, discrepancies in membrane properties derived from DP and ER data were found. This finding may be explained by the introduction of an additional relaxation in the 10kHz region that may be based on two different mechanisms: relaxation of an additional internal membrane charging process, and relaxation of a protein-mediated ion transport process. Model calculations were done to consider the effect of the fast anion-transporter of human red cells (band 3) on the first critical frequency of DP and the first characteristic frequency of ER, respectively, over the external conductivity.*