Zagadnienia Biofizyki Współczesnej tom 15, z.1, 1990, 60-70

Excitation trapping and annihilations in the photosynthetic membrane in the picosecond time scale

Jean Deprez, Andrzej Dobek,Guy Paillotin, Hans –W. Trissl, Jacques Breton

The decay of the excitation created in the antenna of the photosynthetic membrane by picosecond laser pulses is studied in the hypothesis of free energy migration between photosynthetic units ("lake model" description). General equations are formulated and solved to describe the competition between bimolecular singlet annihilations and exciton trapping by reaction centers. The overall fluorescence yield is determined as a function of the intensity of the ps pulse and of the fraction of reaction centers previously closed before excitation. Calculated curves are compared with fluorescence measurements in chloroplasts. The trapping kinetics of excitation by open reaction centers and the fraction of reaction centers closed by the picosecond pulse are also calculated. The theoretical curves are used to fit the amplitude of the photovoltage which arises from the light gradient effect in photosynthetic whole cell suspensions.