A Radical View on Flavins and Their Derivatives

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Paramagnetic intermediates, such as triplet states or spin-correlated radical pairs, are frequently encountered in the blue-light-induced primary responses of photoreceptor proteins containing flavins and derivatives thereof as cofactors. Such species may be favorably probed by their optically generated electron and nuclear hyperpolarizations.

In this contribution selected examples will be presented of how transient and pulsed electron paramagnetic resonance as well as photo-chemically induced nuclear polarization (photo-CIDNP) contribute to unravelling mechanistic details of the primary processes in (i) cryptochrome photoreceptors, a class of flavoproteins involved in the circadian rhythms of plants and animals, and possibly also in the sensing of magnetic fields in a number of species [1–4], and (ii) the light-oxygen-voltage-sensing (LOV) domains, which are protein sensors used to control phototropism, chloroplast relocation and stomatal opening in higher plants. Particular emphasis is placed on protein variants that are modified in their amino-acid sequence and/or reconstituted with modified flavins as cofactors [5,6].

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