

Towards photo-chemically induced dynamic nuclear polarization MAS NMR as a generally applicable enhancement method

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Solid-state photochemically induced dynamic polarization (photo-CIDNP) is one of the hyperpolarization techniques that tremendously enhances the sensitivity and selectivity of solid state nuclear magnetic resonance (NMR). The solid-state photo-CIDNP effect is based on several mechanisms transferring the original electron spin order occurring at the birth of the radical pair to nuclear polarization. Over the years, this technique has proved to be very efficient in understanding the electronic structures of the reaction centre (RC) proteins in several photosynthetic bacteria and plants. We addressed several new issues concerning the capacity of photo-CIDNP MAS NMR as hyperpolarization technique: The applicability to photosynthetic bacteria in cellular level, the use of medium fields to obtain maximum enhancement of NMR signals and its occurrence in non-photosynthetic proteins. From the results, it is assumed that photo-CIDNP effects are rather common in electron transfer systems, if the right conditions are applied and photo-CIDNP MAS NMR has a chance to become an attractive generally applicable hyperpolarization method in NMR.



Dr Smitha is currently a postdoctoral associate in Biosystems and Micromechanics Inter-Disciplinary Research Group of Singapore-MIT Alliance for Research and Technology (SMART). She received his Ph.D. in Chemistry from Solid state NMR group, Leiden University, Netherlands. Her current research focuses increasing the sensitivity and selectivity of the micro magnetic resonance relaxometry and its applications for monitoring various diseases.