

From spin polarization to energy storage: design principle for a (free) radical approach

Stable free radicals such as nitroxides combine in one molecule a series of attractive features including chemical reactivity, redox properties and magnetism that can be tailored to develop creative solutions to problems at the interface of chemistry, spectroscopies, energy storage, biology and materials science.

In the recent years, we have been interested in developing new nitroxides and methods to boost NMR sensitivity via DNP hyperpolarization technique and as redox agents for redox flow batteries for stationary energy storage. The target structures are de novo designed from careful consideration of the specific needs. Organic synthesis, EPR spectroscopy, materials science and photochemistry are combined to access the targets. Function-based screening and design optimization provide new structures, improved knowledge and finally new radicals as efficient alternatives.