Hyperpolarised MRI of Porous Silicon nanoparticles for low-field intracranial imaging (HyPSi)

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RADDESS Low-field magnetic resonance imaging (MRI) of hyperpolarised compounds have the potential to revolutionise medical MRI by allowing development of low-cost portable MRI devices. The approach could enable earlier diagnosis, which would have life-changing consequences especially for patients with cerebrovascular diseases.

MRI is widely used in clinical radiology because it does not require ionizing radiation and has high spatial resolution. However, MRI is inherently insensitive technique and high magnetic fields are required limiting its use to the hospital settings due to the bulky equipment required. Hyperpolarisation enhances signal levels in MRI, which reduces the need for high imaging field, and the clinical translation of dissolution Dynamic Nuclear (hyper)Polarisation is already underway. Up to now, 13C-based agents have dominated the research, but their signal has relatively short lifetimes. In contrast, hyperpolarised silicon nanoparticles can have lifetimes of over one hour.

In this project, we develop methods for MRI imaging using hyperpolarized porous silicon particles as contrast agents in neurological models at high and low magnetic fields. The aim of the project is to establish the experimental basis for further development of hyperpolarized low-field MRI.