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**Dynamic Nuclear Polarization in Silicon**

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Silicon is a promising material for spintronics and spin-based quantum information processing. However, the highly mixed state of the nuclear spins can be a significant limitation, whether the nuclear spins are used as qubits or act as an environment for the electronic spins. We report the results of recent experiments to hyperpolarize the $^{29}$Si spins in silicon. We used microwave-induced dynamic nuclear polarization to achieve 5% polarization of the $^{29}$Si in micro-crystalline silicon powder [1], and 5–8% polarization in antimony- and phosphorus-doped silicon wafers. Since silicon has long $T_1$ relaxation times, polarized silicon micro- and nanoparticles could be of use in magnetic resonance imaging. In the powders the $^{29}$ Si nuclei in the amorphous region (containing unpaired electrons) are polarized by forced electron-nuclear spin flips driven by off-resonant microwave radiation while nuclei in the crystalline region are polarized by spin diffusion across crystalline boundaries. In the wafers the DNP is driven by an Overhauser mechanism within exchange-coupled clusters of donors.

[1] A. Dementyev, D. G. Cory, C. Ramanathan, *Phys. Rev. Lett.*, **100**, Article 127601 (2008).