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Solid-state Nuclear Magnetic Resonance Spectroscopy

The Solid-state Nuclear Magnetic Resonance Spectroscopy (ssNMR) is a well suited tool for characterizing structures of materials on a microscopic scale. Since the magnetic behavior of investigated nuclei is sensitive to the distribution, geometry and distances of neighboring atoms, this technique can give information on chemical environment, symmetry and variety of nonequivalent sites in a structure. By irradiating a sample submitted to a strong magnetic field with an electromagnetic pulse in the radio frequency range (MHz), the active nuclei will be selectively exited. The result of this excitation is detected as an RF signal with structure dependent resonance frequencies, which can be translated into a spectrum. From its peaks' positions and shapes, the aforementioned structural parameters can be inferred. Both crystalline and amorphous solids can be hereby characterized, ranging from ceramics, glasses and minerals, to polymers and enzymes. The basic concepts of solid-state NMR will be introduced, and some examples from literature on the utilization of this technique will be presented.