My Research with ESR, NMR and MRI

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In this talk, I would like to overview my works done together with my colleagues and students, mainly by using NMR methods. Topics are as follows:

- Multiexponential proton relaxation processes of compartmentalized water in gels such as sephadex gels and starch sol and gels.
- Sol/gel transition processes and the network structures of the microbial polysaccharide gellan gum hydrogels, gelatin, and starch gels by ^{1}H-NMR relaxation measurement, water diffusion phenomena and circular dichroism methods.
- Theoretical analysis of water ^{1}H-T_2, based on chemical exchange and polysaccharide mobility during gelation.
- Studies on clay components such as allophone, imogolite, and kaolinite by high-resolution solid-state ^{29}Si- and ^{27}Al-NMR and ESR: ^{29}Si-T_1 relaxation, structural variation with SiO_2/Al_2O_3, and thermal transformation.
- Solid state NMR for materials, such as Yttrium compounds, Boron Carbide, by ^{89}Y, ^{27}Al, ^{13}C, ^{11}B nuclei.
- Development of contrast agents for MRI and evaluation as a new experimental models for MRI