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Recent advances in application of ^{27}Al NMR spectroscopy to materials science

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ABSTRACT

Valuable information about the local environment of the aluminum nucleus can be obtained through ^{27}Al Nuclear Magnetic Resonance (NMR) parameters like the isotropic chemical shift, scalar and quadrupolar coupling constants, and relaxation rate. With nearly 250 scientific articles per year dealing with ^{27}Al NMR spectroscopy, this analytical tool has become popular because of the recent progress has made the acquisition and interpretation of the NMR data much easier. The application of ^{27}Al NMR techniques to various classes of compounds, either in solution or solid-state, has been shown to be extremely informative concerning local structure and chemistry of aluminum in its various environments. The development of experimental methodologies combined with theoretical approaches and modeling has contributed to major advances in spectroscopic characterization especially in materials sciences where long-range periodicity and classical local NMR probes are lacking. In this review we will present an overview of results obtained by ^{27}Al NMR as well as the most relevant methodological developments over the last 25 years, concerning particularly on progress in the application of liquid- and solid-state ^{27}Al NMR to the study of aluminum-based materials such as aluminum polyoxoanions, zeolites, aluminophosphates, and metal-organic-frameworks.

Keywords :
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Chemical shifts
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