

Abstract Submitted
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Li dynamics in carbon-rich polymer-derived SiCN ceramics probed by NMR SEUNG-HO BAEK, Inst for Festkörper Werkstofforschung, LUKAS REINOLD, MAGDALENA GRACZYK-ZAJAC, RALF RIEDEL, Technische Universität Darmstadt, FRANZISKA HAMMERATH, BERND BUECHNER, HAJO GRAFE, Inst for Festkörper Werkstofforschung — We report ^7Li , ^{29}Si , and ^{13}C NMR studies of two different carbon-rich SiCN ceramics SiCN-1 and SiCN-3 derived from the preceramic polymers polyphenylvinylsilylcarbodiimide and polyphenylvinylsilazane, respectively. From the spectral analysis of the three nuclei at room temperature, we find that only the ^{13}C spectrum is strongly influenced by Li insertion/extraction, suggesting that carbon phases are the major electrochemically active sites for Li storage. Temperature and Larmor frequency (ω_L) dependences of the ^7Li linewidth and spin-lattice relaxation rates T_1^{-1} are described by an activated law with the activation energy E_A of 0.31 eV and the correlation time τ_0 in the high temperature limit of 1.3 ps. The 3/2 power law dependence of T_1^{-1} on ω_L which deviates from the standard Bloembergen, Purcell, and Pound (BPP) model implies that the Li motion on the μs timescale is governed by continuum diffusion mechanism rather than jump diffusion. On the other hand, the rotating frame relaxation rate $T_{1\rho}^{-1}$ results suggest that the slow motion of Li on the ms timescale may be affected by complex diffusion and/or non-diffusion processes.

Seung-Ho Baek
Inst for Festkörper Werkstofforschung

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