分類B

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[Ni(dmit)$_2$]$^-$塩中のクラウンエーテルからなるシリンダーチャネルを介したリチウムイオン伝導の最適化

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Optimizing Lithium Ion Conduction through Crown Ether-Based Cylindrical Channels in [Ni(dmit)$_2$]$^-$ Salts

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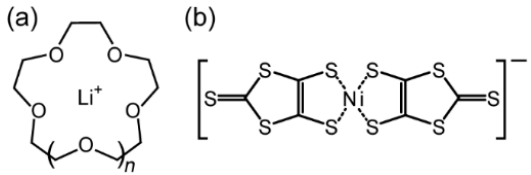

Figure 1. Chemical structures of (a) supramolecular cation (n = 1, 2) and (b) [Ni(dmit)$_2$]$^-$ molecule.

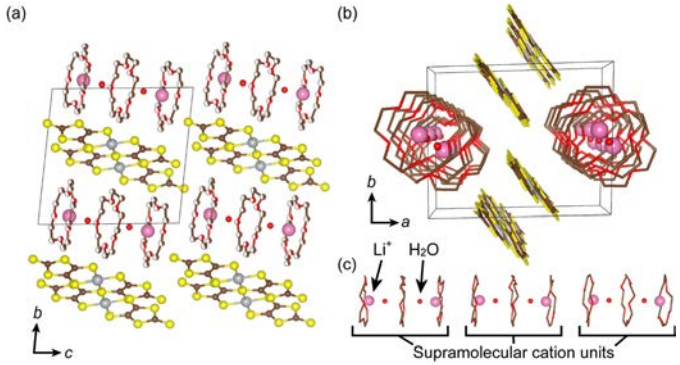

Figure 2. Crystal structures of salt 2 viewed along the (a) *a*-axis and (b) *c*-axis. (c) Arrangement of supramolecular cation units ([15]crown-5, Li$^+$, water molecules) that adopt an ion channel configuration.

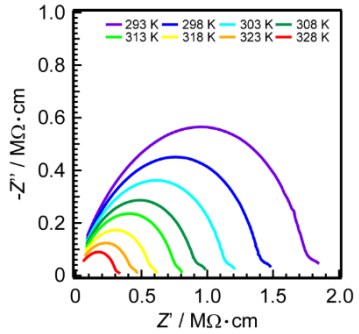

Figure 3. Temperature-dependent impedance spectra of dehydrated salt 2 during heating.

We prepared two isomorphic salts, Li$_2$([18]crown-6)$_3$[Ni(dmit)$_2$]$_2$(H$_2$O)$_4$ (1) and Li$_2$([15]crown-5)$_3$[Ni(dmit)$_2$]$_2$(H$_2$O)$_2$ (2), both of which possess ion channels formed by a one-dimensional array of crown ethers, Li$^+$ ions, and crystalline water molecules. For 1, the Li$^+$ ionic conductivity at 293 K in the crystalline state was enhanced from 1.89 × 10^{-8} S·cm^{-1} to 2.46 × 10^{-7} S·cm^{-1} via dehydration.

二種類の同型結晶Li$_2$([18]crown-6)$_3$[Ni(dmit)$_2$]$_2$(H$_2$O)$_4$ (1) および Li$_2$([15]crown-5)$_3$[Ni(dmit)$_2$]$_2$(H$_2$O)$_2$ (2)を作製し、両結晶がクラウンエーテルとLiイオンの1次元配列によるイオンチャネルの形成と水分子の存在が確認された。結晶1のLiイオン伝導度は、293Kで1.89 x 10^{-8} Scm^{-1}であり、この値は水の脱離で2.46 x 10^{-7} Scm^{-1}に変化した。