

Ferroelectricity Arising From Molecular Rotators in Magnetic [Ni(dmit)₂] Salts

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Molecular rotators have been attracting much attention and many attempts have been carried out for developing artificial molecular motors. We already reported the 180° flip-flop motion of phenyl ring in (anilinium)([18]crown-6)[Ni(dmit)₂] crystal [1, 2]. When we introduce a dipole moment at the phenyl ring, such motion is controllable by an external electric field. Then, molecular rotators can be utilized as polarization rotation units in ferroelectrics.

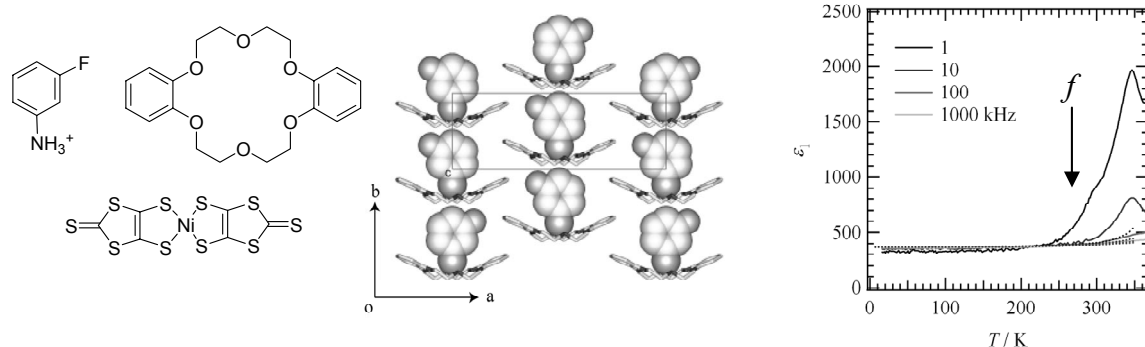


Figure Molecular structure, supramolecular cation arrangements, and dielectric properties of (*m*-FAni⁺)(DB[18]crown-6)[Ni(dmit)₂].

We adopted *m*-fluoroanilinium (*m*-FAni⁺), in which formed a hydrogen-bonding assembly with dibenzo[18]crown-6, and was introduced as the counter cation of [Ni(dmit)₂]⁻ anions (dmit²⁻ = 2-thioxo-1,3-dithiole-4,5-dithiolate) [3]. The orientation of fluorine unit of *m*-FAni⁺ can be controlled by the application of an electric field, resulting in the ferroelectric responses of the crystal. The ferroelectric transition temperature was 348 K. Application of a DC electric field to the single crystal generated for a polar crystal. The results indicate a novel application of solid state supramolecular rotators for the development of ferroelectrics.

[1] S. Nishihara *et al.*, Chem. Asian J. 2 (2007) 1083.

[2] T. Akutagawa, T. Nakamura, Dalton Transactions (2008) 6335.

[3] T. Akutagawa *et al.*, Nature Materials 8 (2009) 342.