Crystal Structure and Ferromagnetic Properties of $[Mn^{II}Cr^{III}(ox)_3]$ Salt with *m*-Fluoroanilinium/Dibenzo[18]crown-6 Supramolecular Cation

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The (*m*-fluoroanilinium)(dibenzo[18]crown-6) supramolecule in the $[Ni(dmit)_2]^-$ salt acts as a rotation unit for ferroelectrics [1], where the flip-flop motion of *m*-fluoroanilinium exhibits dipole inversion by the outer electric filed. The weak antiferromagnetic interaction with a Weiss temperature of -1.2 K was observed in the two-dimensional $[Ni(dmit)_2]$ layer at the temperatures below 30 K. The supramolecular cation unit can combine with functional anion unit.

Here, we report new single crystal of hydrogen-bonding *m*-fluoroanilinium / dibenzo[18]crown-6 combined with ferromagnetic $[Mn^{II}Cr^{III}(ox)_3]$ anion layer. The crystal composition was (*m*-fluoroanilinium)(dibenzo[18]crown-6)$[Mn^{II}Cr^{III}(ox)_3](CH_3CN)(CH_3OH)$ (**1**). The supramolecular cations and $[Mn^{II}Cr^{III}(ox)_3]$ anions arranged along the *c*-axis alternately (Fig.1b), where the $[Mn^{II}Cr^{III}(ox)_3]$ anion formed the infinite two-dimensional honeycomb layer (Fig.1c). The ferromagnetic transition at 5.6 K was observed in magnetic susceptibility measurements of **1**. There is no orientational disorder of *m*-fluoroanilinium related with the 180-degree flip-flop motion.

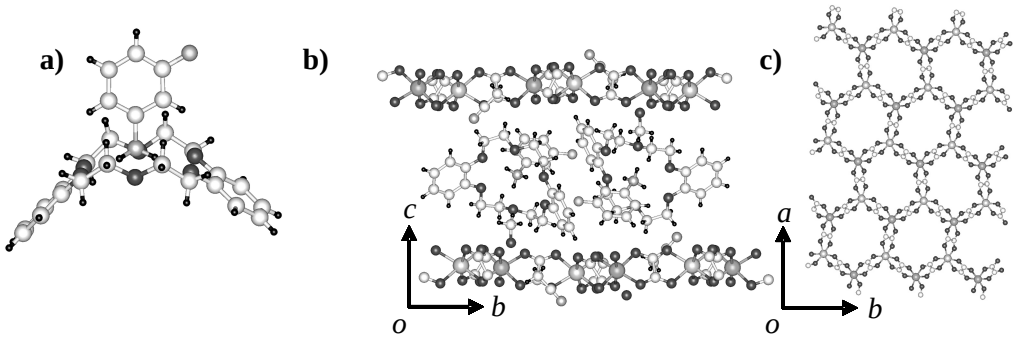

Fig.1 Crystal structure of salt **1**. a) Supramolecular cation structure of (*m*-fluoroanilinium)(dibenzo[18]crown-6). b) Unit cell viewed along the *a*-axis. c) $[Mn^{II}Cr^{III}(ox)_3]$ anion layer within the *ab*-plane.

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