Ferroelectrochemistry goes the design of molecular multiferroics

Wei-Qiang Liao,[1] Ren-Gen Xiong[1]

[1] Ordered Matter Science Research Center, Nanchang University, Nanchang 330031, People's Republic of China, e-mail: liaowq@ncu.edu.cn

Multiferroics, in which two or more kinds of fundamental ferroics such as ferroelectricity, ferromagnetism and ferroelasticity coexist, have become one of the hottest topics of condensed matter physics and materials science in recent years. Molecular materials have the intrinsic advantages of mechanical flexibility, structural tunability, environmental friendliness, and low acoustic impedance. However, molecular multiferroics are very rare, and it is a great challenge to design molecular multiferroic materials.

Inspired by ferroelectrochemistry, the chemical design methodology for molecular ferroelectrics,[1] we constructed several molecular multiferroics.[2-3] For example, we designed an organic-inorganic hybrid perovskite trimethylchloromethylammonium chromium chloride (TMCM-$CrCl_3$), showing the coexistence of ferroelectricity and antiferromagnetism. It displays a paraelectric-ferroelectric phase transition at 397 K with an Aizu notation of 6/*m*F*m*, and spin-canted antiferromagnetic ordering with a Neel temperature of 4.8 K.

References

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