

New Chromium-Based Material with Both Ferromagnetic and Ferroelectric Properties

Chemical
Science



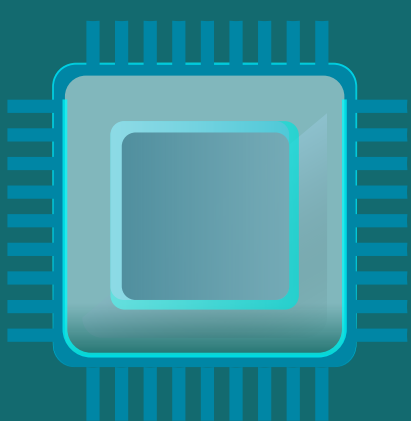
Materials with co-existing ferromagnetism and ferroelectricity can have a wide range of applications



Information storage device



Magnetoelectric sensors



Memory components



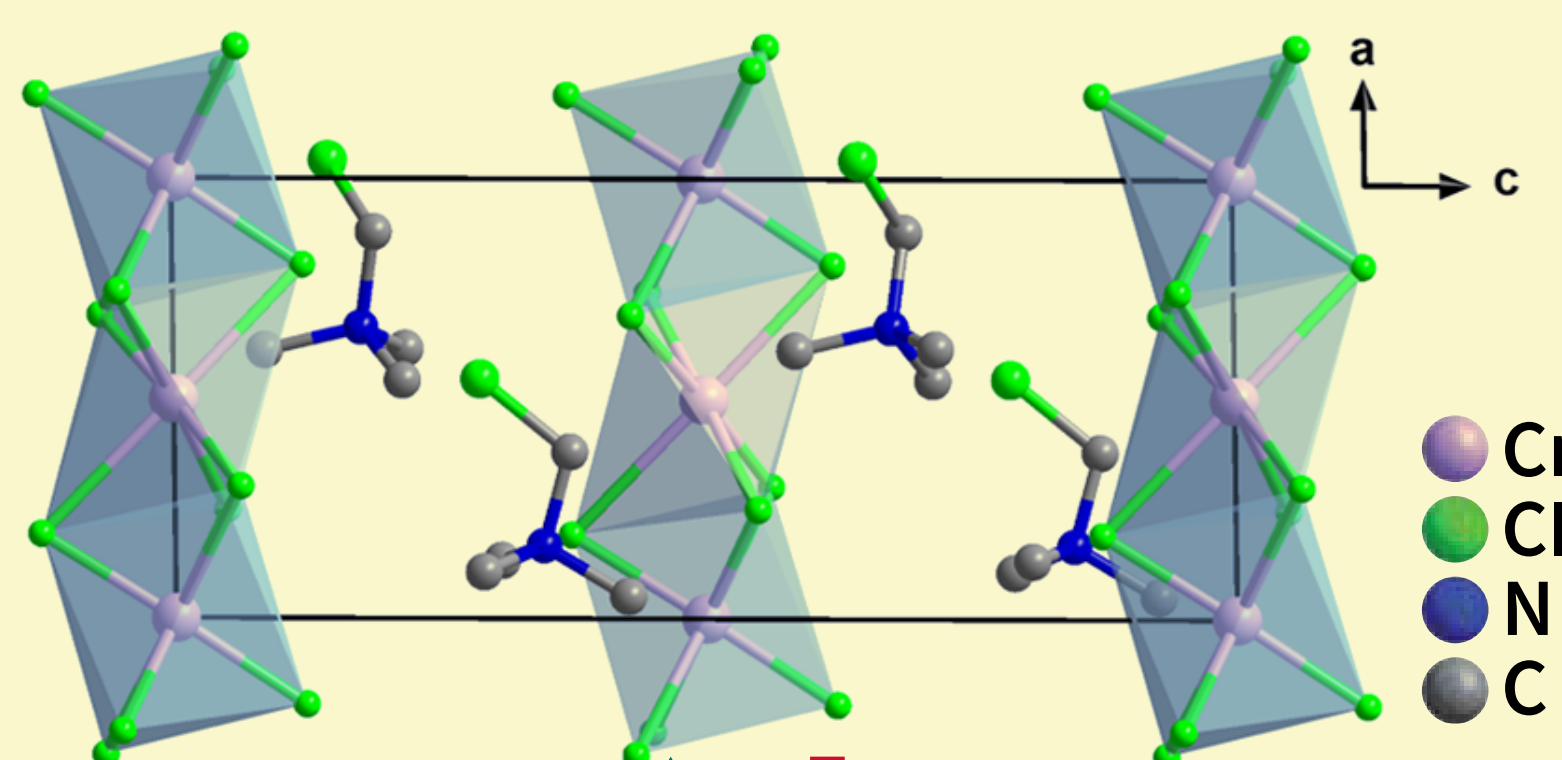
Infrared detectors



Ultrasound probes

Designing new organic-inorganic hybrid perovskite material with co-existing magnetic and electric orderings

Trimethylchloromethylammonium chromium chloride (TMCM-CrCl₃)



Ferroelectricity
(ordered TMCM cations)

Weak ferromagnetism
(strong Cr²⁺...Cr²⁺
antiferromagnetic couplings
with canted spins)

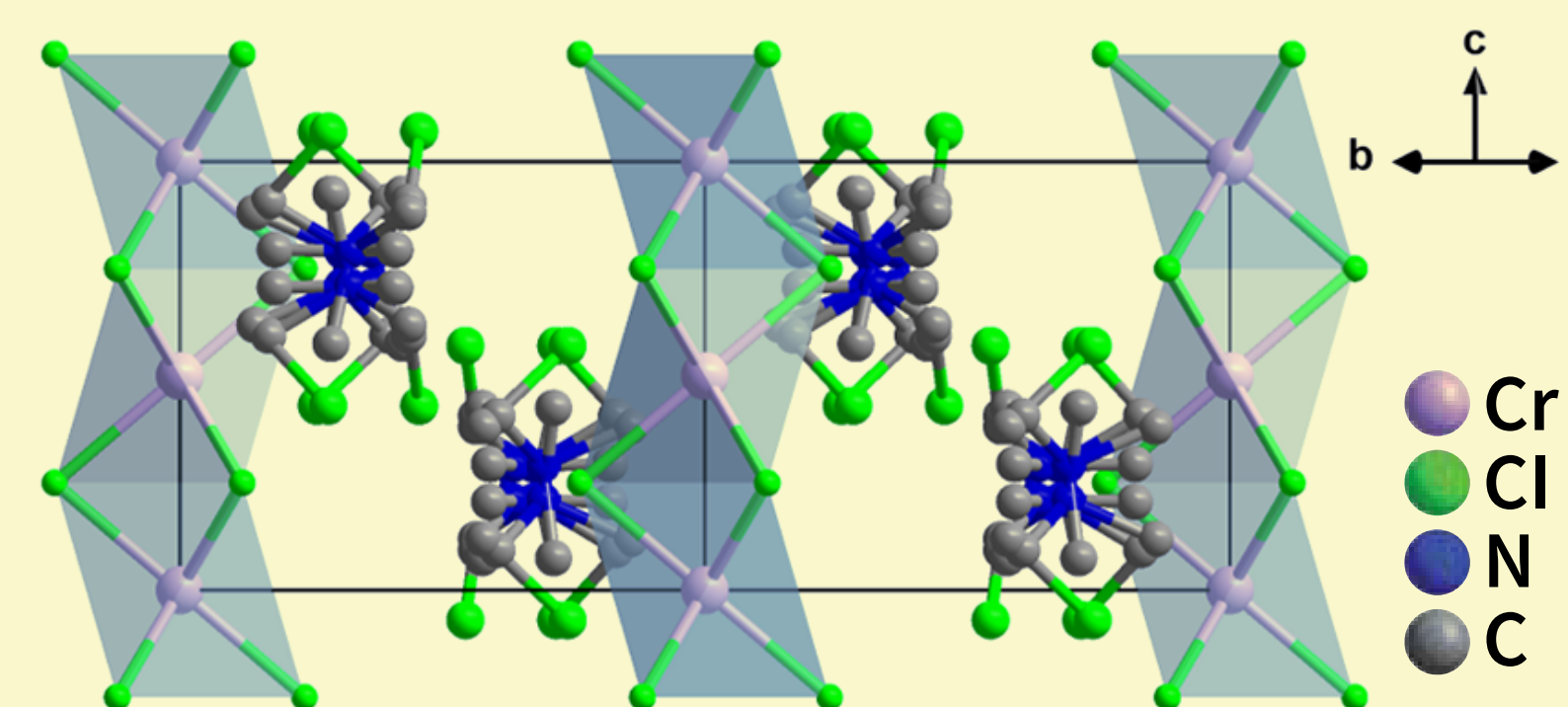
Heating

397 K

Cooling

Paraelectric
(disordered TMCM cations)

Paramagnetic



The study reveals a new category of materials with co-existing magnetic and electric ordering: chromium-based organic-inorganic perovskites