Probing the magnetoelectric coupling in possible 2D multiferroic NiI_2

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Multiferroic materials have attracted wide interest because of their exceptional static and dynamical magnetoelectric properties. Two dimensional materials possessing intrinsic multiferroic properties have been long sought for to enable the harnessing of magnetoelectric coupling in nanoelectronic devices. Here, we report the spectroscopy investigation of possible type II multiferroic order in atomically thin van der Waals material NiI_2. Temperature-dependent Raman spectroscopy reveals that the structural phase transition from trigonal to monoclinic occurs at about 60 K. Combining second-harmonic-generation measurements with theoretical modelling and simulations, we detected a highly anisotropic electronic state that simultaneously breaks the three-fold rotational and inversion symmetry, and support polar order. The evolution of the SHG signatures as a function of temperature and magnetic field questions the microscopic origin of type-II multiferroic orders in NiI_2.

Short Bio:

Mengjian Zhu received his PhD degree in Condensed matter physics from University of Manchester, UK. He is a professor in department of nanoscience, National University of Defense Technology (NUDT). He is currently working as a principal investigator of 2D materials and nanodevice laboratory in NUDT. His main research interests are: (1) quantum optoelectronics based on graphene, two-dimensional materials and the van der Waals heterostructures, (2) carbon-based functional materials and nanodevices, including 1D carbon-nanotube, 2D graphene and 3D diamond. Dr. Zhu is the Editor of Light: Science & Applications and Journal of Semiconductors. He has published more than 50 research papers with citations of 2500 and H-index of 24, holds 5 patents. He is the PI of more than 10 scientific research projects, including National Key R&D Program of China projects and National Natural Science Foundation of China projects.