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Electronic Supplementary Information

Ferroelectricity in Dion-Jacobson ABiNb$_2$O$_7$ (A= Rb, Cs) compounds

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Experimental procedure

The powders of ABiNb$_2$O$_7$ (A = Rb and Cs) were prepared by heating stoichiometric amounts of A_2CO$_3$ (4% excess), Bi$_2$O$_3$ and Nb$_2$O$_5$ in air at 1000 ℃ for 4 hours using a conventional furnace. The ceramics were sintered between 800 ~ 900 ℃ using an SPS furnace (HPD 25/1 FCT, German). A heating rate of 100 ℃/min was used and a pressure of 50 MPa was applied during the SPS process to obtain ceramics with high density. X-ray diffraction (XRD) patterns were measured by a Panalytical Xpert Pro diffractometer. The microstructures of the samples were observed using scanning electron microscope (SEM, FEI, Inspect F, Hillsboro, OR) and transmission electron microscope (TEM, JEOL 2010).

Samples were fired with a platinum paste (Gwent Electronic Materials Ltd., C2011004D5, Pontypool, U.K.) to produce electrodes for electrical properties measurements. The Curie temperatures of samples were determined from the temperature dependence of the dielectric constants and losses, which were measured at different frequencies using an LCR meter (Agilent, 4284A, Hyogo, Japan) connected to a high-temperature tube furnace. The current-electrical field (I-E) and electric displacement-electrical field (D-E) hysteresis loops were measured using a ferroelectric hysteresis measurement tester. Samples for piezoelectric measurements were poled in silicone oil under various DC electric fields. The piezoelectric constant d_{33} was measured using a quasi-static d_{33} meter (CAS, ZJ-3B, Institute of Acoustics, Chinese Academy of Sciences, Beijing, China).

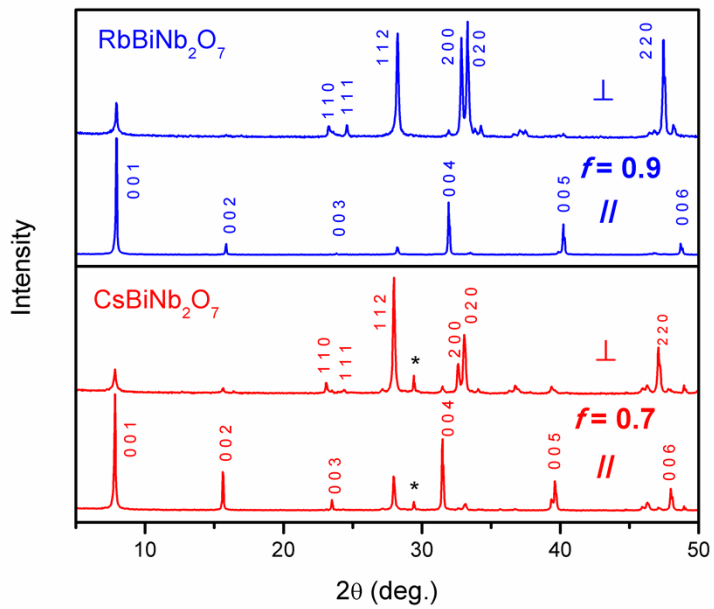

Fig. S1 XRD patterns of sintered $ABiNb_2O_7$ ceramics

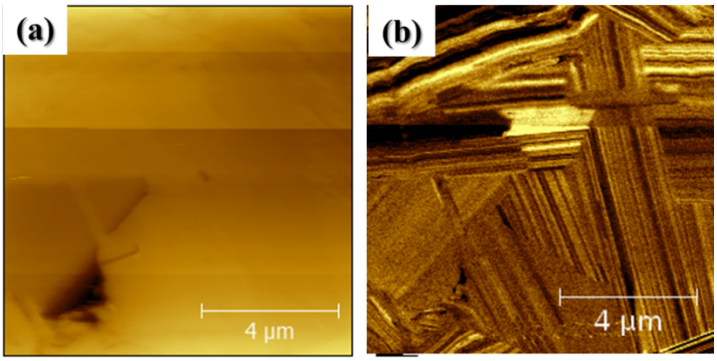

Fig. S2 PFM images of $RbBiNb_2O_7$: (a) topography; (b) phase