Abstract Submitted
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**Multiferroic $BaCoF_4$ Thin Films Grown Via Molecular Beam Epitaxy**[1] PAVEL BORISOV, TRENT JOHNSON, West Virginia University, CAMILO GARCIA-CASTRO, Universite de Liege, Belgium, AMIT KC, DUSTIN SCHRECONGOST, CHENG CEN, ALDO ROMERO, DAVID LEDERMAN, West Virginia University — Multiferroic materials exhibit exciting physics related to the simultaneous presence of multiple long-range orders, in many cases consisting of antiferromagnetic (AF) and ferroelectric (FE) orderings. To date, multiferroic fluoride compounds materials have not been studied nearly as much as oxides. In order to provide a new, promising route for fluoride-based multiferroic material engineering, we grew multiferroic fluoride $BaCoF_4$ in thin film form on $Al_2O_3$ (0001) substrates by molecular beam epitaxy. The films grow with the orthorhombic $b$-axis out-of-plane and with three in-plane structural twin domains along the polar $c$-axis directions. The FE ordering in thin films was verified by FE remanent hysteresis loops measurements at $T = 14$ K and by room temperature piezoforce microscopy (PFM). An AF behavior was found below Neel temperature $T_N = 75$ K, which is in agreement with the bulk properties. At lower temperatures two additional magnetic phase transitions at 19 K and 41 K were found. First-principles calculations demonstrated that the growth strain applied to the bulk $BaCoF_4$ indeed favors two canted spin orders, along the $b$- and $a$-axes, respectively, in addition to the main AF spin order along the $c$-axis.

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