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The ferroelectric to antiferroelectric transition in multiferroic $BiFe_{1-x}Cr_xO_3$ epitaxial films[1] DAE HO KIM, HO NYUNG LEE, MARIA VARELA, HANS M. CHRISTEN, Materials Science and Technology Division, Oak Ridge National Laboratory, Oak Ridge, TN — With the renewed interest in multiferroics, intensive investigations on $BiFeO_3$ films have enhanced the understanding of the nature of the ferroelectricity and the weak parasitic ferromagnetism. In contrast, despite having similar structural and chemical properties as $BiFeO_3$, little is know about $BiCrO_3$, due to the difficulty of synthesizing single-phase material. We have grown high quality $BiCrO_3$ epitaxial films by pulsed laser deposition and revealed that they exhibit antiferroelectricity with an electric- field induced ferroelectric phase. This antiferroelectricity is consistent with the picture of the Bi lone pair inducing polarization in bismuth-based perovskites. Furthermore, we have grown $BiFe_{1-x}Cr_xO_3$ solid-solution epitaxial films from $BiFeO_3$ and $BiCrO_3$ targets and observed a ferroelectric to antiferroelectric transition with increasing the Cr content. The interplay between the structural and (anti) ferroelectric properties and the role of the epitaxial strain will be discussed.

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