## **Supporting Information**

The antiferromagnetic state in ultrathin LaNiO<sub>3</sub> layer supported by long-range exchange bias in LaNiO<sub>3</sub>/SrTiO<sub>3</sub>/La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub> superlattices<sup>†</sup>

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Fig. S1. (a) The surface topography of the STO substrate measured by atomic force microscopy. (b) The surface topography of LNO(2)/STO(2)/LSMO(5) superlattice and the surface roughness is shown to be 0.243 nm. (c) The enlarged HAADF-TEM image for TiO<sub>2</sub>-terminated STO substrate.



Fig. S2. The partial oscillating curve of RHEED during the preparation of the LNO(2 u.c.)/STO(2 u.c.)/LSMO(5 u.c.) superlattice and the RHEED patterns before and after growth of  $(2-2-5)_{10}$  SL.



Fig. S3. XRD patterns for a series of referenced samples.



Fig. S4. Hysteresis loops at 5 K after +5 kOe field cooling from room temperature for a series of referenced samples.



Fig. S5. Magnetic hysteresis loops at 5 K for a series of superlattices with different STO or LAO spacer layer thickness performed after cooling in a field 5 kOe from room temperature as (a) LNO(2 u.c.)/STO(n)/LSMO(5 u.c.), (b) LNO(2 u.c.)/LAO(n)/LSMO(5 u.c.).