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Controlling the dimensionality of the octahedra network in SrRuO₃/SrTiO₃ superlattice MINGQIANG GU, Northwestern University, QIYUN XIE, Nanjing University of Posts and Telecommunications, GUOPING ZHANG, Indiana State University, XIAOSHAN WU, Nanjing University — Two dimensional (2D) systems in perovskites have been widely investigated by designing superlattices. We propose a way to control the dimensionality of the octahedra network in perovskite superlattices by selecting different substrate orientation and superlattice periods. Lower dimensionality like one-dimension (1D) and zero-dimension (0D) can be achieved. Taking SrRuO₃/SrTiO₃ as an example, we demonstrate that the 1D structure is in a 1D Ising state, which is paramagnetic, while the 0D structure is ferromagnetic insulator with fully saturated magnetic moment on the Ru sites. New phenomena in the magnetic and electronic properties are observed, including large strain response, half-metallicity, and orbital-selective quantum confinement effects.

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