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Anion-based approaches to tunable functionality in oxide heterostructures[1]

STEVEN MAY, Department of Materials Science and Engineering, Drexel University

The ability to control the position and composition of the anion site is emerging as a promising route to tune properties in epitaxial perovskites. This talk will focus on recent and ongoing efforts aimed at developing anion-based approaches to tailor electronic and magnetic properties in oxide films. First, I will discuss how the position of the oxygen anions can be tailored to stabilize non-bulk-like bond angles and lengths, thereby altering electronic bandwidth. Recent work on $La_{2/3}Sr_{1/3}MnO_3$ will be presented in which ultrathin films under the same strain state exhibit dramatically different electronic and magnetic properties when grown on substrates with different symmetries. In the second half of the talk, I will describe efforts focused on altering the composition of the anion site. In $La_{1/3}Sr_{2/3}FeO_{3-\delta}$ films, a reversible change in oxygen content leads to dramatic changes in electrical, optical, and structural properties. Finally, the synthesis of oxyfluoride ferrite and nickelate perovskite films via topotactic reactions carried out following thin film deposition will be described.

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