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Tailoring Spin Textures in Patterned Perovskite Oxide Heterostructures YAYOI TAKAMURA, MICHAEL LEE, RAJESH CHOPDEKAR, THOMAS WYNN, JOSEPH BROWN, ALEX KANE, KYLE HOKE, University of California, Davis, ERIK FOLVEN, JOSTEIN GREPSTAD, Norwegian University of Science and Technology, SCOTT RETTERER, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, ANTHONY YOUNG, ANDREAS SCHOLL, Advanced Light Source, Lawrence Berkeley National Laboratory — Engineered topological spin textures in magnetic materials have emerged in recent years as the building blocks for various spin-based memory devices. Examples of these magnetic configurations include magnetic skyrmions, vortices, and domain walls. In this work, we explore how the unique properties of perovskite oxide heterostructures provide additional means to control the spin textures found in patterned micromagnets. In particular, interfaces of perovskite oxides have been shown to exhibit unexpected functional properties not found in the constituent materials. These properties arise due to various structural and chemical changes as well as electronic and/or magnetic interactions occurring over nanometer length scales at the interfaces. The resulting spin textures originate from the delicate balance between exchange interactions, as well as shape and magnetocrystalline anisotropy energies and demonstrate the tunability of magnetic parameters in perovskite oxides through methods such as nanostructuring and local strain engineering.

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