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Spectroscopic Evidence for the Emergence of a Half-Metallic Surface State on the Bulk Insulator Sodium Cobaltate[1] ALEX W. CONTRYMAN, FRANCIS NIESTEMSKI, GANG XU, HAIJUN ZHANG, SUKBUM CHUNG, Stanford University, YULIN CHEN, THORSTEN HESJEDAL, Oxford University, SHREYAS G. PATANKAR, DANIEL GOLUBCHIK, JOSEPH ORENSTEIN, University of California, Berkeley, Z.X. SHEN, SHOUCHENG ZHANG, HARI C. MANOHARAN, Stanford University — In recent years Na_xCoO_2 has attracted much attention for its unconventional superconductivity and antiferromagnetic phases. More recently, the stoichiometric compound $NaCoO_2$ has been proposed as a platform for achieving topological superconductivity through its predicted half-metallic surface state. We characterize this surface state and its relationship to local sodium concentration using low-temperature scanning tunneling spectroscopy (STS) and tuning fork-based atomic force microscopy. We also examine the magnetic moment of the surface state through temperature-dependent STS and Kerr rotation spectroscopy. These results are compared with density functional theory-calculated band structure and local density of states.

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