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Driving towards superconducting thin films of Sr2RuO4: A status report XINXIN CAI, RAJIV MISRA, RONALD MYERS, YIQUN YING, PETER SCHIFFER, YING LIU, Pennsylvania State University, CAROLINA ADAMO, KYLE SHEN, DARRELL SCHLOM, Cornell University — Chiral p-wave superconductor Sr_2RuO_4 has attracted attention recently in the context of quantum computing because of the proposed possibility of using this exotic superconductor to make topologically protected qubits. To accomplish this, however, superconducting thin films of Sr_2RuO_4 are required. Our latest drive towards this long-standing goal has involved the growth of epitaxial thin films of Sr_2RuO_4 using molecular beam epitaxy (MBE) and the characterization by various techniques. We carried out electrical and magneto transport and scanning Raman spectroscopy measurements on c-axis oriented Sr_2RuO_4 films grown on (100) LSAT substrates, and demonstrated steady progress on improving the film quality. However, the lowest residual resistivity obtained so far suggests that the films are still not of sufficiently high quality to exhibit superconductivity, which will be confirmed by measurements down to dilution refrigerator temperatures. Nevertheless, interesting behavior, such as an unexpected linear temperature dependence in resistivity, has been found. Additional measurements, such as tunneling, are being pursued to clarify the origin of this observation. The work is supported by DOE, DOD ARO and NSF.

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