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Structure, Morphology and SRF Characteristics of Superconducting Niobium Thin Films on Ceramic Substrates DOUGLAS BERINGER, Department of Physics, The College of William and Mary, WILLIAM ROACH, CESAR CLAVERO, Department of Applied Science, The College of William and Mary, ROSA ALEJANDRA LUKASZEW, Professor of Physics and Applied Science, The College of William and Mary, CHARLES REECE, Director of Institute for SRF Science and Technology, Jefferson Lab, INSTITUTE FOR SRF SCIENCE AND TECHNOLOGY, JEFFERSON LAB COLLABORATION — The need to improve superconducting thin film coatings for radio frequency (SRF) cavities used in linear accelerators has inspired recent niobium thin film research. To better understand the SRF properties in thin film niobium, correlated studies of structure, surface morphology and SRF performance are examined. Recent work on epitaxial growth of niobium on insulating ceramic substrates — a-plane sapphire and MgO (001) — anticipates Superconducting / Insulating / Superconducting (SIS) multilayer structures, which have been proposed as a means to achieve higher field gradients in SRF cavities, overcoming the intrinsic SRF limitations of bulk niobium. A fundamental study correlating structure, morphology and SRF superconducting properties of niobium thin films is an imperative first step towards realizing next generation SRF materials.

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