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Scanning tunneling spectroscopy and high-frequency response of MgB2 films M.S. RZCHOWSKI, D.M. KIM, J. GIENCKE, C.B. EOM, University of Wisconsin-Madison, T.W. HEITMANN, Syracuse University — The critical issues governing thin-film MgB2 applications can be traced to factors both microscopic, arising from the two-gap structure and scattering mechanisms, as well as mesoscopic, determined by connectivity and grain boundary characteristics. These are intertwined to the extent that substitutional doping to control gap characteristics and band scattering can strongly affect connectivity through grain boundary segregation and growth of second phases. These issues can be addressed with a combined approach of gap characterization by low-temperature scanning tunneling spectroscopy, and temperature-dependent microwave conductivity measurements. We discuss preliminary results characterizing gap properties with low-temperature superconducting-tip scanning tunneling microscopy, and 10 GHz cavity-based microwave conductivity measurements.

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