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Probing the Photoresponse of Superconducting Materials and Devices by Laser Scanning Microscopy[1] STEVEN ANLAGE[2], BEHNOOD GHAMSARI, University of Maryland — We present the results of photoresponse experiments on superconducting rf/microwave devices, including Niobium and Cuprate resonators and metamaterials, by means of laser scanning microscopy. The spatially inhomogeneous photoresponse of these devices reveals the distribution of rf/microwave currents. Moreover, it will be discussed that the dependence of the phase of the photoresponse to the exciting microwave frequency may be used to bifurcate the kinetic and resistive parts of the photoresponse mechanism, which, in turn, could be used to probe the evolution of the local order parameter at different temperatures. Furthermore, we will examine the possibility of imaging the anisotropy of superconducting properties, as in the anisotropic Meissner effect, by investigating the photoresponse of a working superconducting resonator to visible light. While most of the aforementioned devices consist of thin films and cast into resonant structures, we will further discuss the techniques through which these measurements can be extended to bulk materials as well as non-resonant structures. These results are particularly useful for identifying the sources of quench and hot spots in a variety of superconducting devices including superconducting RF cavities.

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