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Multipactor Breakdown Thresholds at 110 GHz S. C. SCHAUB, M. A. SHAPIRO, R. J. TEMKIN, Massachusetts Institute of Technology — A high power, 110 GHz source has been used to experimentally measure the maximum sustainable electric fields on dielectric materials in vacuum. The purpose of this work is to evaluate the suitability of these materials for potential future applications in high frequency linear accelerators or passive high power microwave components. There was previously a lack of data at frequencies above 11 GHz. Materials tested include alumina, sapphire, fused quartz, crystal quartz, and high resistivity silicon. Dielectric samples are tested both as windows, with electric fields parallel to the surface, and sub-wavelength dielectric rod waveguides, with electric fields perpendicular to the surface. The experiment was designed to test surface electric fields in excess of 100 MV/m. Samples were tested with 3 microsecond pulses of microwave power. Visible light emission, absorbed/scattered microwave power, and emitted electrons are used to detect and monitor discharges on dielectric surfaces. The results of these experiments have been compared to theoretical calculations of multipactor breakdown thresholds, testing these theories at significantly higher frequencies than has been done before.

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