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Complex Permittivity of Powder Metal Compacts by Cavity Perturbation Technique[1] CHRIS LYNCH[2], EARNIE JOHNSON, JUNKUN MA, NICHOLAS MISKOVSKY, GARY WEISEL, BROCK WEISS, DARIN ZIMMERMAN[3], The Pennsylvania State University, Altoona College — We present measurements of the complex permittivity of powder metal compacts using microwave cavity perturbation techniques. Using a 2.45GHz, TM_{010} microwave cavity operating in conjunction with a vector network analyzer, we have systematically measured the real (ε') and imaginary (ε") parts of the effective complex permittivity of pure, powder metal, cylindrical samples (0.25in by 0.25in). By placing these in the electric-field antinode, the dielectric properties at microwave frequencies are obtained by comparison with the expected change in the cavity Q by perturbation theory. We have studied the effect of varying particle size and green density as means to understand the absorption and heating of powdered metals in microwave fields. We acknowledge the additional work of undergraduates Kelly Martin and Charles Smith, who assisted in the setup of experimental apparatus, sample preparation, and data acquisition.

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