Abstracts

Microwave Processing and Diagnosis of Chemically Reacting Materials in a Single-Mode Cavity Applicator

J. Jow, M.C. Hawley, M. Finzel, J. Asmussen, Jr., H.-H. Lin and B. Manring. "Microwave Processing and Diagnosis of Chemically Reacting Materials in a Single-Mode Cavity Applicator." 1987 Transactions on Microwave Theory and Techniques 35.12 (Dec. 1987 [T-MTT] (1987 Symposium Issue)): 1435-1443.

On-line chemically reacting microwave processing and dielectric diagnosis of materials (epoxy/amine) have been successfully performed using a TM/sub 012/-mode cylindrical cavity at a frequency of 2.45 GHz in conjunction with fluoroptic temperature measurement. Complex permittivity measurements by this single-frequency technique are repeatable and consistent with those obtained by conventional swept frequency methods. ‘The accuracy of complex permittivity measurements for both methods is within ±5 percent for permittivity (epsilon') and ±15 percent for loss (epsilon"). Both techniques are based on material-cavity perturbation theory. Perturbation equations for cylindrical shapes of the cavity and loaded material have been derived to account for volume variation of the sample due to thermal expansion. Complex permittivity of epoxy/amine as a function of the extent of cure and temperature was determined in order to monitor the chemical reaction progress during microwave processing.

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