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Fabrication of Waveguides for Characterization of Low-k Dielectric Thin Films JAMES MCDONALD, KEVIN RADICAN, HEATHER GALLOWAY, DAVID DONNELLY, DEBORAH KOECK, Texas State University - San Marcos — As microelectronic devices increase in clock frequency, the RC time delay in transmission lines is becoming an obstacle. A technique used in overcoming this obstacle is the use of low-k dielectrics along with less resistive metals such as Al in microchip fabrication. We have demonstrated a method of constructing coplanar waveguide test structures on low-k dielectric thin films deposited on SiC/Si wafers using standard industry techniques. The dielectric properties of the low-k dielectric thin films on wafers can then be measured at microwave frequencies (.5 to 13.5 GHz) using these test structures. The details of the fabrication of the waveguide structures using DC magnetron sputter deposition, semiconductor laser beam lithography, and reactive plasma etching with tetrafluoroethane will be reported. The magnetron chamber was pumped to a base pressure of 4×10^{-7} Torr that yielded a deposition rate of 100 angstroms a second. The photolithography process is a combination of several steps, spinning, baking, exposing, and developing. The plasma etching was in the magnetron with a plasma consisting of HFC 134a (1,1,1,2-tetrafluoroethane) and O_2 at 20 mTorr to remove the low-k and SiC under layer.

James McDonald
Texas State University - San Marcos

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