



3D Microwave & Millimetre-Wave System-on-Substrate using Sacrificial Layers for Printed RF MEMS Components

Ian Robertson, University of Leeds

Microwave and millimetre-wave systems are used extensively in communications, radar, imaging and sensing applications. System-on-substrate (SoS) technology is an exciting new concept where bulky coaxial cables and rectangular waveguide interconnects are replaced by low loss transmission lines embedded into a multi-layer substrate that incorporates a wide range of components and subsystems. The advantages of this approach are dramatically enhanced if Radiofrequency (RF) Microelectromechanical Systems (MEMS) can be integrated into the substrate. MEMS components have had an explosive impact on consumer products including the iPhone and Nintendo Wii motion-sensing devices.

Currently these products are fabricated with expensive silicon technology. From a manufacturing cost perspective, it is a much more attractive proposition to be able to fabricate the RF MEMS components in ceramic or organic laminate technology – i.e. directly onto a printed circuit board. This would lead to a technology capable of being used to manufacture large-scale system-on-substrate designs for applications such as scanning antenna arrays and adaptive stealth materials for a range of applications at microwave and millimetre-wave frequencies. It is proposed that these novel embedded RF MEMS components can be fabricated by employing screen printing and by developing novel techniques based on sacrificial layers which are removed in a controlled manner during firing. It is envisaged that an effective and manufacturable solution would have a significant impact on UK industry in the area.