

# Microwave Materials Move Technology Forward

This issue's Technology Report includes several announcements from companies that make microwave materials or use specialized materials in their products. These announcements illustrate some of the interesting developments in the physics and chemistry that allow microwave components to achieve better performance, lower cost, or both.

## New Polyimide and PTFE Materials

Park Electrochemical Corp. has introduced its new N7000-2 V0 toughened polyimide substrate material. The material is provided in laminate and prepreg form, and offers printed circuit board fabricators a high-Tg polyimide package with a UL 94 V0 designation. The N7000-2 V0 material offers enhanced drilling performance and improved thermal resistance compared to other toughened polyimide systems. Excellent z-axis expansion properties help maintain performance in fine geometry multilayer constructions.

Park also has introduced new RF PTFE/epoxy blended material that combines the processing ease of epoxy with RF/microwave performance of PTFE. The N9000-13 laminate materials are offered in dielectric constants of 3.0, 3.2 and 3.5 and a variety of core thicknesses. Uses include such high frequency, low-loss applications as LNBS, in-building antennas and automotive telematics.

Information: [www.parkelectro.com](http://www.parkelectro.com)  
and [www.parknelco.com](http://www.parknelco.com)

## Miniature Alumina Ceramics

Morgan Advanced Ceramics (MAC) provides a its miniature dry-pressed alumina ceramics and advanced fabrication processes. MAC's GBC division manufactures small-pressed alumina substrates for miniature components such as varactors. The company is capable of high volumes, as well as the ability to manufacture parts as small as 0.007 inch inside diameter, 0.010 inch wall thickness and 0.008 inch length.

Information: [www.morganadvancedceramics.com](http://www.morganadvancedceramics.com)

## Tantalum Nitride Thin Film Components

IRC Advanced Film Division has developed thin film microwave component technology using its proprietary TaNFilm® process. The material can support

applications up to 6 GHz and its self-passivating characteristic improves component reliability. Photolithography and plasma-etching techniques are used in the manufacture of RF and microwave component using this material.

Information: [www.arctf.com](http://www.arctf.com)

## 6-inch Wafer Bipolar Process Qualified

PolarFab has achieved 6-inch wafer qualification for its 1.25-micron, 30-volt junction-isolated modular bipolar and complementary bipolar process. The qualification was performed in accordance with the JP-001 standard, a foundry process qualification guide recently released jointly by the JEDEC Solid State Technology Association and the Fabless Semiconductor Association (FSA). The BP-30 process features an NPN transistor capable of 3 GHz with 30-V  $BV_{cer}$  and a 30-V  $BV_{cbo}$ . Other devices include a 30-V lateral Schottky diode, a buried zener diode and high-density capacitors. An isolated vertical PNP is available as an optional module. Design support includes a Cadence Process Design Kit, fully characterized device models, ESD protection and complete documentation.

Information: [www.polarfab.com](http://www.polarfab.com)

## High Frequency Laminate Data Update

Rogers Corporation has recently updated product data for its RO3200 Series ceramic-filled laminates reinforced with woven fiberglass. RO3203 has a dielectric constant of 3.02 and, together with a dissipation factor of 0.0016, is suitable for applications up to 40 GHz. RO3206 has a dielectric constant of 6.15, while RO3210 has a dielectric constant of 10.2. The laminates are available with copper cladding in 1/2, 1 or 2 oz./ft.<sup>2</sup> (17, 35 or 70  $\mu$ m thickness).

The distinguishing characteristic of the RO3200 Series versus the RO3000 Series is improved mechanical stability. The in-plane expansion coefficient is matched to copper, making it suitable for use with epoxy glass in multilayer boards.

Information: [www.rogerscorporation.com](http://www.rogerscorporation.com)

## Moldable and Castable Absorber Materials

Emerson & Cuming Microwave Products offers developed unique compounds with magnetic and

dielectric properties. These compounds can be used with injection moulding and thermal compression techniques for production of high quantities. Standard dimensional tolerances can be maintained with moulding techniques. Within the magnetically loaded compounds, the applications include absorber termination loads, attenuators, absorber covers and housings. Dielectric loaded compounds are customized in function of the required permittivity, temperature and mechanical stability.

The company has also introduced a new precision casting process for manufacture of custom RF and microwave parts. This process is amenable to many standard ECCOSORB product lines including MF, MF-500, MF-UHF and MFS. Castable absorber technology has evolved as a way to improve part cost over traditional machining of uniquely shaped custom parts. Generally, these cast parts can be 2 to 4 times less expensive and require shorter lead-times.

**Information: [www.eccosorb.com](http://www.eccosorb.com)**

### **Tunable Parts Use Thin-Film Technology**

Agile Materials & Technologies offers a line of tunable components based on capacitors that use a ferromagnetic material, Barium Strontium Titanate (BST), as the dielectric material. The dielectric constant of BST, and therefore the capacitance, can be adjusted by

applying a DC voltage. The company uses this technique in a family of tunable filters, phase shifters and impedance matching networks.

As an example of the tuning range available using this technology, a particular BST capacitor may have a zero volt capacitance of 32 pF, which is reduced to 16 pF with +4 or -4 volts applied—a 2:1 capacitance range. Current draw is minimal (leakage current only). Circuits using this tuning method may be manually tuned, computer-controlled or tuned via a feedback loop in the system. Advantages of easy tunability include lower out-of-band interference, maximum power transfer efficiency and other optimization functions that are often fixed-tuned to a compromise value.

**Information: [www.agilematerials.com](http://www.agilematerials.com)**

### **Catalog Describes Magnetic and Dielectric Microwave Materials**

EMS Technologies offers bulk materials and finished goods using lithium ferrites, yttrium iron garnets (YIG) and ceramic dielectric materials. Specialized materials are also offered, including magnesium-manganese ferrites and strontium based hexagonal ferrites. The company provides complete high-volume, high-precision fabrication services, as described in the latest catalog.

**Information: [www.emsstg.com](http://www.emsstg.com)**