

Tech Talk

Fine Lines in High Yield (Part CL)

The First 150 Tech Talks - a Reflection

Karl H. Dietz (for CircuiTree Magazine, March, 2008)



Karl Dietz is the manager at DuPont's Electronic Materials Laboratory, Research Triangle Park, NC. His responsibilities include application studies for printed circuit materials. Karl has 35 years of experience in a variety of R&D, manufacturing and quality control functions and holds a PhD. in organic chemistry from the University of Frankfurt, Germany. If you would like to participate in the exchange or if you have any questions, Karl Dietz can be reached at 919-248-5248, fax: (919) 248-5132, or via e-mail <Karl.h.dietz@usa.dupont.com>.

In January 2004 Tech Talk Number 100 issued. I used the occasion to reflect on industry changes during the course of the last 100 months that seemed noteworthy, and I reminisced about the beginnings of this column.

It was in the spring of 1995 when Ray Rasmussen visited DuPont's Electronic Technology Center in Research Triangle Park, NC, to interview Steve Quindlen, Director of the Printed Circuit Materials (PCM) Business Unit at the time, on issues such as PCM's strategy, business direction, and technology roadmap. One result of the meeting was a feature in CircuiTree on DuPont's Printed Circuit Material business. Another one was the fact that Steve volunteered me to share in a monthly column in CircuiTree the collective experience of our Applied Technology Group (which I led at the time). The column title was going to be Tech Talk, probably a brain-child of Ray. The theme was going to be Image Transfer in PWB Fabrication, in particular the challenges of producing "fine lines in high yield" which then became the Leitmotiv of Tech Talk. Steve, Ray, and I moved on to other endeavors, but the Tech Talk beat went on.

I should say a word about the Roman numerals we have used to number the Tech Talks. These Roman numerals have confused me and our readership for many years, but once started, I did not have the heart to change them.

Tech Talk Number 100 observed that after years of dealing with a confusing array of alphabet soup acronyms that all described microvia technology, the industry had finally converged on "HDI" (high density interconnect) as the label for technology that involves building microvia layers sequentially on a rigid core. This definition has since become somewhat obsolete because there are now a number of microvia processes, such as the ALIVH, NMBI and PALAP processes, that are characterized by the fact that microvia layers are formed in parallel and then laminated together to form a core-less structure. By 2004, the discussion about which technology for microvia formation would ultimately prevail was pretty much over: lasers had won over

plasma, photovia, imprint, or mechanical controlled depth drilling.

I mentioned in Tech Talk Number 100 that the traditional demarcation lines between IC fabrication, first and second level packaging had blurred in the last five to ten years. Technologies used in IC packaging had penetrated PWB fabrication (e.g. the use of steppers in the circuitization of BGA substrates, i.e. small multilayer boards with microvias, and, conversely, elements of PWB fabrication had entered IC fabrication (e.g. copper and low Dk dielectrics). This blurring of technology demarcation lines appears to have continued. We now see via filling by copper electroplating in packaging just as IC fabricators are practicing it in the dual-damascene process. Likewise, "planarization" steps, once unique to IC fabrication, can now be found in some first level packaging processes. Furthermore, the characteristic recessed or embedded circuitry of the dual-damascene process is actively being looked at for packaging as a way to form finer circuits, more reliable structures, and more planar structures for flip chip assembly.

There are a number of significant other industry trends that mark recent years. The much talked about shift of PWB production to Asia forced suppliers to also shift to Asia and most likely will attract OEM design activities to Asia. Then there was the growth of flex and rigid-flex driven by cell phones, digital cameras, camcorders, and medical applications. Much progress has been made in the handling and processing of very thin core materials. Embedded passive component technologies are still evolving but have already found mass production applications. After several false starts, LDI (laser direct imaging) is now growing beyond niche applications in prototyping and quick-turn shops. Optical interconnects at the chip level, or in first and second level packaging are still elusive but will no doubt become viable at a larger scale.

I am looking forward to following these events in the coming years and to write about them in CircuiTree!



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