PCB, CCL, and Substrate

Takeaways from Prismark expert call

Technology

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We hosted senior consultant Terry Wang from Prismark to cover a few recent topics, such as the CPO impact on PCB/CCL and the potential outlook for PTFE adoption. Key takeaways are:

- **CPO impact on high-speed CCL likely manageable.** CPO does not mechanically translate into a "downgrade" of PCB/CCL specs because the system still needs high-performance materials to support power delivery and residual on-board data movement/communication (i.e., requirements persist beyond the optical link itself). As a result, M7 (or higher-grade) CCL is still expected to be utilized. As CPO adoption is expected to start on scale-out switches first in 2026, and while other domains will take longer to commercialize, near-term displacement of high-speed CCL demand is limited. In addition, as form factors scale (so that switch chips can host optical engines), board/substrate size and warpage/flatness constraints will likely become key factors for system performance and give rise to the need for low-CTE (and therefore higher-end) materials, even if CPO adoption becomes more prevalent.
- **PTFE adoption not yet finalized, with processability remaining a key gating factor.** On the high-profile PTFE topic, the conclusion is that PTFE has not yet cleared the practical hurdles required for stable PCB mass production (e.g., lamination/process window and reliability-related issues) and that a "qualification" outcome does not necessarily lead to scalable manufacturing. For the highest-layer-count use cases (e.g., backplane, whose layer count has exceeded 100), the material choice remains unsettled and a subject of ongoing debate, suggesting that PTFE should be treated as a developing pathway, rather than a confirmed, imminent reset of the incumbent material roadmap. For the glass-less CCL option currently being explored, the adoption will give rise to new PCB fabrication processes and therefore first-mover advantage for those that can revolutionize their production ahead of the industry.
- **Upstream materials: S/D remains tight; resin could be the next differentiator for CCL.** On glass fiber, capacity conversion toward higher-end products (i.e., low-DK and low-CTE fabrics) effectively raises processing intensity and could cap near-term effective output, keeping the market tighter than headline capacity additions would imply. However, low-end glass fiber products' S/D gap could narrow at one point, as the technology barrier is relatively lower for the overall supply to expand. On copper foil, higher-grade HVLP supply is still viewed as structurally constrained, with new capacity often limited by yield/quality ramps, rather than nameplate announcements. Meanwhile, when it comes to the driver of future CCL upgrades, discussion points may shift toward resin—where formulations are proprietary and the interaction between resin and filler becomes critical—leaving room for continued performance improvement (possibility of further improvement beyond BCB/Benzocyclobutene, while hydrocarbon resins may still exist).
- **PCB/substrate competitive dynamics continue to favor incumbents.** On overall PCB/substrate competition going forward, the rising technical demands (warpage control, thicker boards, and PCB fabrication process revolution) increase the barriers to entry and customer qualification lead times, which structurally favors established players with proven track records. While

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some newer entrants may pursue aggressive capacity expansion, AI-grade execution and customer risk tolerance tend to concentrate order allocation with the leaders. As a result, the landscape is likely to continue consolidating around scaled, quality-proven manufacturers, reinforcing the “leader gets bigger” outcome.

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