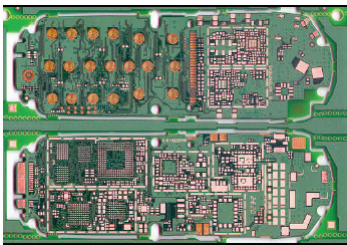


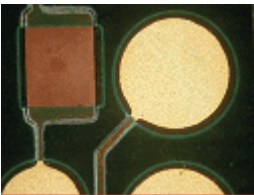
# DuPont Imaging Materials

## APPLICATION PROFILE

### DuPont™ Riston® improves the drop resistance of portable devices



Cell phone motherboard selectively finished with ENIG (Electroless Nickel/Immersion Gold) plating on touchpads and non-compliant areas. Solder areas are left with a surface optimal for solder joint reliability.



Close-up of pad with ENIG next to a copper pad with surface finish for optimum solder joint reliability.

### Challenge

The traditional metal finish on cellular phone circuit boards was made by Electroless Nickel/Immersion Gold (ENIG) plating before the year 2000. The ENIG provides good conductivity and scratch resistance on the touch pad and connecting areas. However, too many metal layers on a solder joint weakens it, and reduces the reliability of the component (solder-gold-nickel-copper).

This problem used to result in many cellular phones being deemed useless once you dropped it, and they had to be replaced. This was true before the year 2000, and before the introduction of DuPont™ Riston® W250 (available in Asia) and FX250 (available in Europe and North America). Fortunately, this is no longer the case. Recent cell phone designs have circuit boards that have two different metal surfaces to ensure reliability: a touch pad with nickel/gold, and a solder joint with copper. This provides the right metal finish required for different functions of the various circuit boards pad areas.

### Solution

Selectively finish the board with ENIG only where needed. A highly durable photoresist is required for this process to withstand the aggressive ENIG plating chemistry. Solder joint areas are protected with DuPont™ Riston® W250 or FX250 dry film photoresist through the ENIG plating process. This resist is a unique product that is tough enough to withstand harsh plating chemistries while still being removable. Improved accuracy, higher yield, lower cost and improved cell phone reliability are further benefits.

### Application Description

To achieve a selective metal finish, the solder joint areas need to be protected by a plating resist before nickel/gold plating. Electroless Nickel/Immersion Gold plating is a very harsh solution with high temperature (80-90°C), and aggressive chemistry requirements. The plating resist must withstand these challenging temperature and chemistry requirements, resolve fine features, have low impact on the plating bath, and be easy to remove.



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Photoimageable resist was one of the candidates for this process, since it can resolve fine features, and is easy to strip. However, resistance to temperature and impact to plating bath were big challenges for the typically used plating resists. Riston® W250 and FX250 were proven to have good compatibility with the harsh process. Performance and reliability is excellent when the process is properly set up.

Since 2002, selective metal finishes have become mainstream for cellular phone circuit boards. In 2005, the ENIG process was used for production of more than 60% of the world's cellular phones.

### **Materials Selected and Why**

The operation latitude, or process window, of selective ENIG plating is narrow. A well-balanced process is required since some process demands are conflicting. The photoresist must withstand extreme plating conditions while still being removable after completed processing. Board design, plating cells, and photoresist must work in harmony to enable success. DuPont™ Riston® W250 and FX250 dry film resist help enlarge the process window due to excellent durability, adhesion and strippability.

Riston® W250 and FX250 offer optimized performance and compatibility with several plating bath vendors, and has become the industry standard for critical selective metallization processes such as ENIG plating. Besides improving reliability of portable devices, the success of Riston® W250 and FX250 has enabled some producers of automotive devices to achieve improved reliability using a similar selective ENIG process.

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