

# **Copper Corrosion Suppression For Advanced Nodes In Ruthenium Barrier Chemical Mechanical Polishing**

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Ruthenium (Ru) has emerged as a potential barrier metal to replace Tantalum/Tantalum nitride for the advanced nodes of Copper (Cu) interconnect since it has the lower resistivity and the capability of direct electroplating of Cu and simply requires a thin single layer to act as a barrier. However, there are several technical challenges in Ru barrier CMP (Chemical Mechanical Polishing) process. It is commonly known that Ru is inert to most chemicals and has a high hardness (6.5 Mohs hardness) to make it difficult to polish during the CMP process. In addition, it was recently reported that Cu shows faster dissolution in the presence of Ru which results in Cu recess [1]. Since the impacts of Cu recess are getting more critical for more advanced node of electrical device, Cu recess has to be completely suppressed. However, its mechanism has not been uncovered.

In this study, we present two significant findings. Firstly, we have established a model to simulate Cu recess in the presence of Ru. Secondly, we have also successfully reduced Cu corrosion in that model by developing a new technology for Cu corrosion suppression. Our study suggests that our newly developed technology can work better for the advanced nodes in Ru barrier CMP than the conventional barrier slurry.

[1] R. Patlolla et al., ICPT 2015 IBM