

## **The Effects of Electrolytic Copper Plating Additive Decomposition By-Products on HPLC and CVS Measurements**

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The use of copper plating for metallization on semiconductor devices has driven increased requirements for the purity, plating effectiveness, plating quality, fill characteristics, and plating speed of electroplating bath chemicals. Requirements for copper plating on semiconductor devices requires filling of sub-micron features. This is achieved by optimizing the choice and concentration of different organic additives based on nitrogen/sulfur compounds commonly called brighteners, levelers and carriers.

As a plating bath ages, the additives are both consumed by the process and broken down into electrolysis by-products. Due to this by-product formation the additives must be replenished at frequent intervals to assure the bath is operating in the optimal range. If the by-products are allowed to build up in the bath they tend to affect cyclic voltammetric stripping analysis (CVS) of the organic additives. This can be the result of breakdown products of one or more of the organic additives, or from the addition of other chemicals used in maintenance of one or more components in the plating bath.

This paper describes the study of the effects of electrolysis by-products upon the Cyclic Voltammetric Stripping (CVS), and High Performance Liquid Chromatography (HPLC) measurement of Accelerator and Leveler contained in an electrolytic acid copper plating bath.