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## Hydrogen Generation and Co-deposition in Electroless Copper Plating

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Electroless copper films are used in printed circuit board industry to establish a conductive layer on insulating substrates. These films may have failures (voids, blisters) related to stress and/or hydrogen co-deposition in Cu films. Typical methods to determine amount of hydrogen are destructive and indirect. We have developed a time-resolved method to measure amount of hydrogen released from Cu deposits after plating. At ambient conditions, films with high initial hydrogen loading release hydrogen for several days. Hydrogen content and hydrogen-related compressive film stress component in copper are proportional with a slope of  $(3.2 \pm 0.3)$  MPa/at.% H. Nickel, as an additive, promotes adhesion and changes stress in electroless copper film from compressive to tensile. The present work shows that nickel suppresses hydrogen incorporation into the Cu film from typically 25 to 0.01 at.% (thus explaining the stress effect), while hydrogen release during plating remains almost unchanged.

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