Title: IMPROVED METHOD FOR ANALYSIS OF THREE ORGANIC ADDITIVES IN AN ACID COPPER PLATING BATH

Abstract: Acid copper electroplating baths used to form ultra-fine circuitry features on semiconductor chips contain suppressor, anti-suppressor and leveler additives that must be closely controlled in order to obtain acceptable copper deposits. Cyclic voltammetric stripping (CVS) methods are available to measure the concentrations of the suppressor and anti-suppressor based on the effects of these additives on the copper electrodeposition rate. The present invention is a method that also uses measurements of the copper electrodeposition rate to determine the concentration of the leveler additive. The other two additives are included in the measurement solution at concentrations determined to provide the optimum compromise between minimal interference, high sensitivity and good reproducibility for the leveler analysis. In this case, measurement precision is greatly improved compared to that provided by inclusion of the interfering additives in the measurement solution at their concentrations in the bath sample at the time of the analysis, which would be the standard analytical procedure.
## INTERNATIONAL SEARCH REPORT

**PCT/US02/30598**

### A. CLASSIFICATION OF SUBJECT MATTER
- **IPC(7)**: G01N 27/26; C25D 21/12
- **US CL**: 205/81, 101, 296, 775, 780.5, 786.5, 787
- According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED
- Minimum documentation searched (classification system followed by classification symbols)
  - U.S.: 205/81, 101, 296, 775, 780.5, 786.5, 787

- Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

- Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
  - Please See Continuation Sheet

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search: 24 March 2003 (24.03.2003)

Date of mailing of the international search report: 03 APR 2003

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Continuation of B. FIELDS SEARCHED Item 3:
APS
electroplate, electrodeposit, analyze, additive, copper