

1) Design and realization of thermo controlled bath for wet Nitrietch for analytical purposes with characterization of etch rates and selectivity.

Short background: Nitrietch, called Malberty-Ciappa etch is special wet etch used in Failure Analysis for removing of passivation nitride (SiN) layer as an effective alternative to plasma etch. This etch must be performed at temperature in range 65-70°C (system should be working up to 200°C); therefore the thermo controlled chemical bath is necessary. The goal of the project is to design such bath with controller and characterize etch properties of the developed wet etch system.

Project assigned for: student of electronics, material science with circuitry background
Workplace: Office, Workshop, ONPY2 Clean rooms

Scope of project:

- Refresh / get theoretical knowledge on PID regulation and its practical application for controlling the temperature of the small chemical bath for analytical purposes. Note: literature on similar FA system available in English.
- Design Aluminum platform for single 6 inch wafer with heating elements (involving resistive, Joule heat) optimized for safe low supply voltage (12 V) separated from the temperature controller. Focusing to safety of the operators. Note: the platform will be produced by external workshop based on technical drawing.
- Application of commercial available PID regulator with Pt sensor and power source 200-300W for supplying heating platform and temperature control.
- Characterization of the temperature dynamics of the designed heater system (heating and cooling)
- Writing documentation for designed system in English language, including principles, design, drawings, schematics, characteristics, etc.
- Characterization of etch rates and selectivity of Nitrietch to Oxides, PolySi, AlCu, SOG, respectively other layers.
Note: measurement of layer thicknesses will be performed by student itself on tools available in ONPY2 (short training will be given by responsible process owner)
- Writing report on results from the Nitrietch investigation
- Final report in MS Power Point summarizing results of the work + oral presentation
- Additional topic: If the project is finished earlier
 - Characterization of the Fuming Nitride Acid etch of epoxy IC packages at 60°C.

Further information can be found in internet using key words:

“PID regulation”, “PID regulator”, “SiN etch”, “Wet-Etch of Nitride Passivation Layers : An Effective Alternative to Plasma Etch for Failure Analysis”, “Nitrietch”, “ReedEtch”, “Failure Analysis”, “Accelerated Analysis”, “onpy.onsemi.com/efa”

2) Design and programming of internal request database based on requirements by EFA Laboratory.

Short background: New built EFA Laboratory (Electrical Failure Analysis Laboratory) covers the solving of issues in the production line. Up to now the Failure analysis was requested by engineers only by e-mail and the searching capability was not covered. The goal of this project is designing of an optimized database for creating, editing, viewing, reviewing, storing of requests, preliminary results, statuses and finally reports. Attention must be paid to searching capability.

Project assigned for: IT student with experiences in DB

Workplace: Office, close cooperation with ON Semi IT department

Scope of project:

- Using appropriate and by ON Semi used DB system (discussion with out IT department).
- Designing database hierarchy and structure (requirements will be covered by EFA Lab, based on discussions, goals, improvements, etc...)
- Programming work based on determined structure of the requests, reports etc.
- Entering existing information (requests, reports, results) to created database
- Testing phase
- Further improvements (e-mail notification, etc.)
- Documentation in written works with description of DB hierarchy and structure (in English)
- User manual how to submit request, how to search in DB, how to view the status, how to get preliminary or final report, etc. (in English and Slovak)
- Final report in MS Power Point summarizing results of the work + oral presentation
- Some additional task up to further requirements

Further information can be found in internet using key words:

“Failure Analysis”, “Photoemission”, “Integrated Circuit”, “pal.onsemi.com”, “onpy.onsemi.com\efa”

3) Automation of DC Measurement Rack through GP-IB by help of Agilent VEE platform.

Short background: DC measurement rack consists of several instruments equipped with GP-IB. This rack is used for supplying of bias voltages to investigated integrated circuit or structure during photoemission. All these instruments including power DC sources and curve tracer should be controlled by program application. Note: how this application should look, what should be controlled and what should be the output will be discussed during the project.

Project assigned for: student of electronic and material science with basic background on visual programming (not important, VEE language is really easy to learn)

Workplace: Office, ONP2 Clean room

Scope of project:

- Refresh / get theoretical knowledge on GP-IB, Agilent VEE 7.5
Note: literature, manuals, examples available in English
- Get into touch with instruments in the DC measurement rack, understanding how they operate, which limitations they have, how to operate them, how to communicate with these instruments through GP-IB bus
- Programming user friendly communication and data acquisition interface
- Writing documentation for developed user interface, including operators instructions in Slovak and English language
- Updating EFA internal web pages with results of the work
- Additionally if there is remaining time to the end of the project:
 - adaptation of the output information to photoemission image legend
 - some additional task up to further requirements

Further information can be found in internet using key words:

“Failure Analysis”, “Photoemission”, “Integrated Circuit”, “curve tracer”, “Agilent VEE”, “Tektronix 370A”, “RHODE&SCHWARZ”, “GP-IB”, “Photoemission”

Slovenský preklad názvov tém:

- 1) Návrh a realizácia aparatury pre mokré leptanie nitridov pomocou NitriEtch leptadla s využitím pre analytické účely.***

- 2) Návrh a softwarová realizácia internej databázy a užívateľského prostredia pre potreby EFA Laboratórium.***

- 3) Automatizácia časti DC meracieho pracoviska v EFA laboratóriu využitím GP-IB komunikácie a objektovo orientovaného programovacieho jazyka Agilent VEE.***

by Valentin Kulikov, ON Semiconductor Piešťany