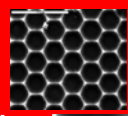
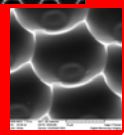
PROCEDEU DE REALIZARE A RETELELOR MATRICIALE DE MICROALVEOLE, PE SUBSTRAT DE STICLA BOROSILICATA, PRIN CORODARE UMEDA





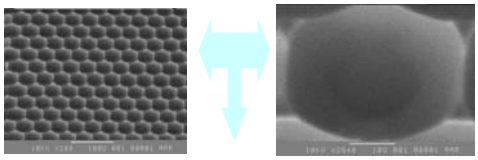
Manea Elena, Podaru Cecilia, Cernica Ileana Viorica, Ciuciumis Alina, Moldovan Carmen Aura

Titularul brevetului de inventie: Institutul National de Cercetare – Dezvoltare pentru Microtehnologie, IMT - Bucuresti

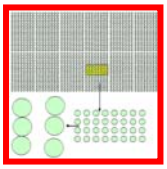
Cerere de brevet: A 00391/28.04.2004

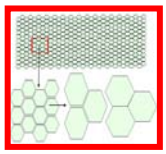
DESCRIEREA INVENTIEI

Inventia se refera la un **procedeu de realizare** a **retelelor matriciale** de microalveole pe **substrat de sticla borosilicata**, prin **corodare umeda** in solutii alcaline, in scopul compatibilizarii substratului prelucrat cu metode utilizate pentru aplicatii in diferite domenii.



Imagini SEM ale microalveolelor



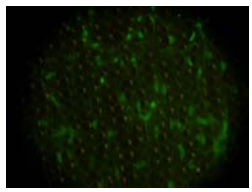


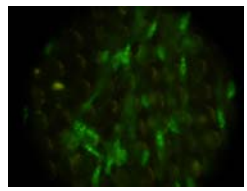
Microalveole organizate in retea de tip fagure

Microalveole organizate in retea de tip rastru

APLICATII

STRUCTURILE DE RETELE MATRICIALE DE MICROALVEOLE PE SUBSTRAT DE STICLA, REALIZATE CONFORM INVENTIEI CU SOLUTIA ANIZOTROPA DE KOH, POT FI **UTILIZATE** IN APLICATII MEDICALE SI FARMACEUTICE, CA **SUPORTURI TEXTURIZATE** PENTRU STUDIUL MATERIALULUI BIOLOGIC, PRIN MICROSCOPIE OPTICA.





Culturi de fibroblaste dermale pe substrat de sticla texturata - imagine optica (20X)

Celule nervoase prelevate din encefal de soarece, crescute "in vitro", pe substrat de sticla texturata – imagine optica (40X)

REVENDICARI

❑ 1. Procedeul de realizare a retelelor matriciale de microalveole pe substrat de sticla, conform inventiei, caracterizat prin aceea ca utilizeaza sticla borosilicata Corning in scopul realizarii prin corodare umeda, in solutii alcaline, de suprafete cu rugozitate mica, in scopul compatibilizarii substratului prelucrat cu metodele utilizate pentru aplicatii in diverse domenii.

❑ 2. Procedeul de realizare a retelelor matriciale de microalveole pe substrat de sticla borosilicata prin corodare umeda, conform revendicarii precedente, caracterizat prin aceea ca sticla borosilicata Corning este acoperita pe una din fete cu un strat dublu de mascare format din: substartul (2) de Cr de grosime de 15 nm si substartul (3) de Au de grosime de 100 nm, ambele realizate prin depunere in vid inalt.

❑ 3. Procedeul de realizare a retelelor matriciale de microalveole pe substrat de sticla borosilicata, prin corodare umeda, conform primei revendicari, caracterizat prin aceea ca in scopul gravarii izotrope a stratului de sticla borosilicata, s-a utilizat solutia de corodare umeda de KOH (45%), la temperatura de 80^{0}C.

❑ 4. Procedeu de realizare a retelelor matriciale de microalveole pe substrat de sticla borosilicata, prin corodare umeda, conform revendicarii 2, caracterizat prin aceea ca, procesul de corodare umeda a celor doua metale (2) si (3) este precedat de o imersie in solutie 10% de detergent neionic MOS, care asigura uniformitatea corodarii.

AVANTAJELE INVENTIEI

❖ Procedeul de realizare a retelelor matriciale de microalveole pe substrat de sticla, conform inventiei, asigura obtinerea unor structuri de retele matriciale de microalveole, realizate la comanda, cu geometrie variabila si timp scurt de proiectare si relizare, prin proiectarea tehnologica a proceselor si asocierea lor optima intr-un flux tehnologic.

❖ Procedeul de realizare a retelelor matriciale de microalveole pe substrat de sticla, conform inventiei, are urmatoarele avantaje:

✓ procesul utilizeaza avantajul adeziunii filmului subtire de crom, atât la substratul de sticla, cât si la filmul de aur

✓ stratul dublu realizat din Cr si Au este rezistent ca strat de mascare, la corodarea sticlei timp indelungat, in orice solutie chimica

✓ solutia de corodare, de KOH, aleasa conform inventiei, asigura o rugozitate mica a suprafetei atacate si, prin urmare, o transparenta totala a sticlei dupa corodare

❖ Modalitatea specifica de microconfigurare in suprafata si volum, determina manifestarea unor modalitati si grade diferite de regenerare a unor straturi confluente de celule, premergatoare regenerarii unui tesut propriu-zis, datorita cailor specifice de stimulare a functiilor celulare in interactia celula - celula si celula - substrat

PREMII

Eureka 2004, Bruxelles
Medalie de argint

TECHNOLOGY FOR MICRO DEVICE ON SILICON FOR DNA IDENTIFICATION

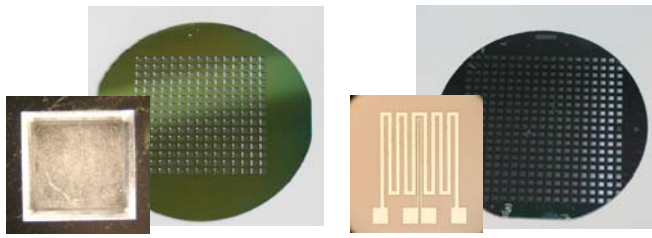
Monica Simion, Irina Kleps, Anca Angelescu, Teodora Neghina, Mihaela Miu, Adina Bragaru, Tatiana Oana Nedelcu, Florea Craciunoiu, (IMT-Bucharest), Eduard Condac (I`Université de Bucarest – Faculté de Biologie)

Titular: Institutul National de Cercetare – Dezvoltare pentru Microtehnologie, IMT-Bucuresti

Patent request:A/ 00737-29 08 2005 (OSIM-Bucharest) Hold by IMT -Bucharest

Classic System

Micro device(5x5mm) on lab on a chip technology Brevet proposal



Advantage:

With this technology there were obtained microreactors with heating elements on the same silicon wafer for PCR reaction. This device will replace the classic PCR machine.
A micro device that could be directly coupled to capillary electrophoresis system

Analyses on a single chip

Small volumes for all reagents

Low cost of the device fabrication

Technical characteristics

Volume for one reservoir 10 µl	Volume for one reservoir 3 µl
Cycle period 2h.	Cycle period 20 min.
Voltage 220V	Voltage 6V

- **COUPLED ELECTRO-THERMAL SIMULATION FOR PCR SILICON CHIP,** Oana Tatiana NEDELCU, Monica SIMION, Irina KLEPS, Anca ANGELESCU, Mihaela MIU , **THERMINIC04**, Côte d'Azur, France,2004
- "Design And Electro-Thermal Simulation For PCR Silicon Chip", Oana Tatiana NEDELCU, Monica SIMION, Irina KLEPS, Anca ANGELESCU, Mihaela MIU, "CAS 2004" Sinaia, Romania
- **Micro fluidic Biochip for Bio-medical Application,** Monica Simion, Anca Angelescu, Irina Kleps, Mihaela Miu, Marioara Avram, Florea Craciunoiu, Teodora Ignat, Adina Bragaru, **ICM 2004**, Tunis, Tunisia, 2004
- **Electro-Thermal Simulation and Design of Silicon Based Bioanalytical Micro- devices,** Monica SIMION, Irina KLEPS, Oana Tatiana NEDELCU, Anca ANGELESCU, Mihaela MIU, **ICIT2004**, Hammamet,Tunisia, 2004
- **Nanoporous silicon matrix used as biomaterial,** Monica Simion, Irina Kleps, Teodora Negina, Anca Angelescu,Mihaela Miu, Adina Bragaru, Mihai Danila, Eduard Condac, Lorand Lavu, Marieta Costache, **ISMANAM05**, France, 2005
- **Nanostructured Silicon Chips As Biosensor Components**, A. Angelescu, M. Miu , I. Kleps, S.Petrescu, L.Zdrentu, M.Simion and T.Ignat, EUROSENSORS XIX, Barcelona. Spain, 2005
- **Bioanalytical Silicon Micro-devices for DNA,** Monica Simion, Irina Kleps, Teodora Ignat, Eduard Condac, Florea Craciunoiu, Anca Angelescu, Mihaela Miu, Adina Bragaru, Marieta Costache and Lorand Savu, CAS 2005, 1-2 oct 2005, Sinaia
- **Biocompatible Gold/Si Nanocompozite Layers**, I.Kleps, M. Danila, M. Miu, M. Simion, T.Ignat, A. Bragaru, acceptata CAS 2005, 1-2 oct. 2005, Sinaia

LA TECHNOLOGIE POUR OBTENIR DES MICROMATRICES PHOTODETECTEURS PIN POUR DES APPLICATIONS EN TELECOMUNICATIONS PAR LES FIBRES OPTIQUES

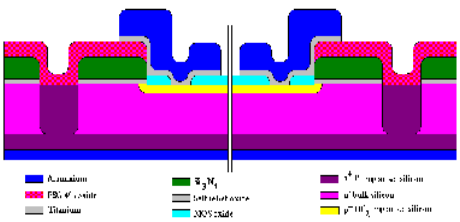
CERNICA Ileana, MANEA Elena, DINOIU Ioana

Titulaire: Institut national pour Recherche et le développement dans Microtechnologies (IMT-Bucharest)

OSIM A/00360/24.04.2003
Medaille D'argent - Salon International des Inventions Gèneve 2005

Description:

L'invention traîte d'une téchnologie de réalisation des micromatrices aux photodiodes PIN à haute vitesse pour couplage aux fibres optiques.



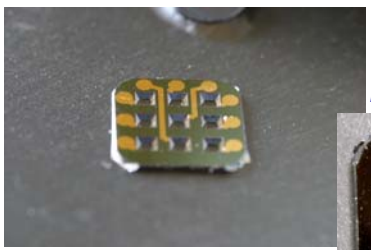
photodiodes PIN chip

Originalité du projet:

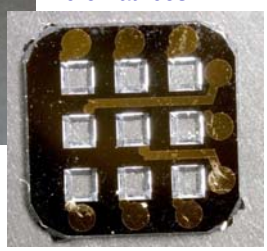
- Lay-out variable des microdetecteurs, fonction de l'arrangement des fibre dans le câble optique
- téchnologie novatrice permettant le couplage optimale microdétecteur-fibre optique

Applications:

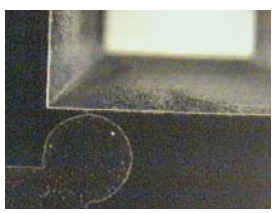
- ❖Réseaux de télécommunication
- ❖Réseaux d'ordinateurs
- ❖Rangées de portes moyennes des sièges sociaux (pour les télécommunications locaux)
- ❖Communications réservées pour les applications militaires.



Micromatrices



Détail



Avantages:

- ✓ Temps de réponse super-rapides
- ✓ Détection de large bande
- ✓ Pertes réduites aux transmissions
- ✓ Empaquetage et assemblage des matrices adaptées à la configuration solicitée du câble
- ✓ Temps de fabrication réduit (structurées comme 'rangées de portes'- gate array)
- ✓ Prix de fabrication réduit

STRUCTURE FOR THE THERMAL MANAGEMENT OF INTEGRATED CIRCUITS AND MICROSYSTEMS

MOAGAR POLADIAN Gabriel (gabim@imt.ro), PhD senior researcher

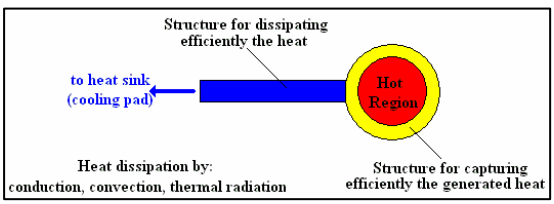
Titular: Institutul National de Cercetare – Dezvoltare pentru Microtehnologie, IMT-Bucuresti

Brief description

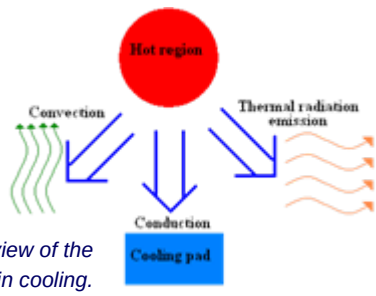
The invention refers to a structure for the thermal management of integrated circuits and microsystems, structure that allows the selective cooling of only some of the circuit's regions.

How does the structure work

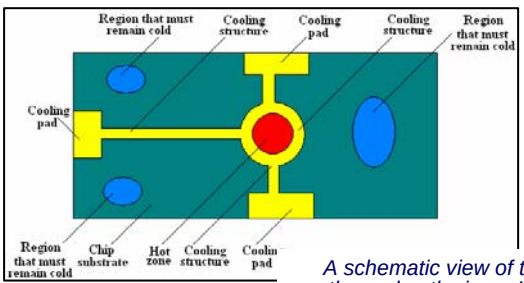
It is configured in such a way that has a high efficiency in capturing the heat and a good efficiency in dissipating the heat taken from the hot zone. Can be configured easily in the immediate neighbourhood of the hot zone while eluding the cold regions. The selectivity is given by the fact that the respective structure for the thermal management is configured according to cooling necessities in such a way that the hot region is not able to dissipate the heat towards other regions of the substrate excepting the cooling zones. It can be used also for heating selectively, with a good efficiency, some regions of an integrated circuit or microsystem according to the user's wish.



A schematic view of the heat flux path.



A schematic view of the processes involved in cooling.



A schematic view of the thermal paths in an IC.

Advantages

- has a great efficiency as compared to other passive cooling techniques.
- it allows the selective cooling of only the hot
- regions of the integrated circuit or microsystem.
- is easy to be realized and does not add supplementary costs to the manufacturing process
- it is fully compatible with Silicon and Germanium technologies.
- does not consume energy.
- can be used in conjunction with other cooling methods, such as thermoelectric or microfluidic.
- Can be used both for cooling or heating of an integrated circuit or microsystem region.

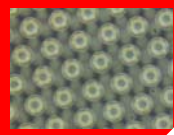
Acknowledgements

This work is supported by the Romanian Ministry for Education and Research under the contract Finantare Nucleu 13 N / 2003 .

Intellectual property: There is one patent application.

Medaille D'Argent - Salon International des Inventions Gèneve 2005

MICROCONCENTRATOARE OPTICE PENTRU CELULE SOLARE, BAZATE PE MICROSTRUCTURAREA DE SUPRAFATA A SUBSTRATULUI

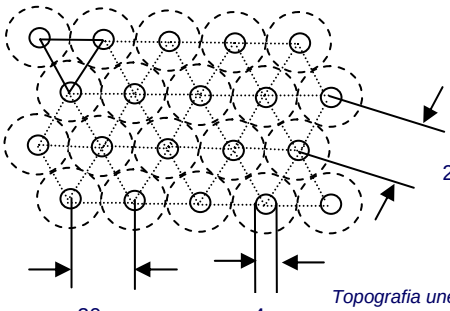


Manea Elena, Cernica Ileana Viorica, Dumbravescu Nicolae

Titular: Institutul National de Cercetare – Dezvoltare pentru Microtehnologie, IMT-Bucuresti

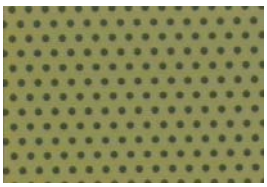
- Microconcentratoarele optice pentru celule solare, au fost realizate in scopul cresterii eficientei celulelor fotovoltaice, prin microstructurarea de suprafata a substratului.

In acest scop, s-a ales o topografie care consta in ferestre (goluri), uniform spatiate in vârfurile unui triunghi echilateral, obtinându-se o retea de tip fagure.

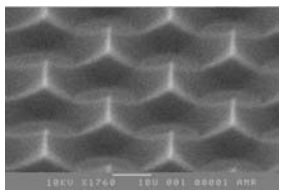


Topografia unei retele hexagonale de alveole

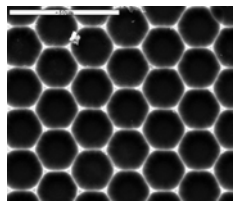
- Texturizarea suprafetelor s-a realizat prin corodarea suprafetei printr-un strat de mascare, utilizând topografia "*retea tip fagure",* in scopul formarii de pereti semisferici, in urma corodarii.
- In momentul in care peretii semisferici vecini, se ating se formeaza structuri hexagonale.



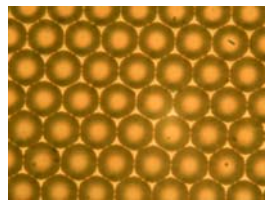
Strat de mascare configurat in retea de tip fagure



Microconcentratoare optice obtinute prin texturarea suprafetei siliciului – imagine SEM



a).



b).

Retea de microconcentratoare optice realizate pe substrat de sticla borosilicata

a) – imagine SEM; b) – imagine in iluminare directa perpendicular pe suparfata (40X)

AVANTAJE

- Microconcentratoarele optice sunt definite ca o retea hexagonala de alveole, ceea ce asigura o impachetare maxima a suprafetelor.
- Texturizarea suprafetei frontale a celulei, procedeu prin care se obtin asa numitele "black cells". Acest procedeu implica formarea prin corodare anizotropica la suprafata plachetei de siliciu a unor santuri sau piramide inversate care sa permita o mai eficienta captare a luminii in interiorul celulei.

PREMII

APLICATII

Sunt destinate aplicatiilor din domenii de activitate care utilizeaza celule solare de inalta eficienta:

- Unitatile producatoare de aparatura de comanda si control industrial
- Unitati care functioneaza izolat (statii meteo, faruri)
- Unitati producatoare de aparatura medicala
- Universitati (ca material didactic dar si experimental pentru alimentarea cu energie a amfiteatrelor)
- Unitati de exploatare GSM – ORANGE, CONEX, COSMOROM

REFLECTIVE CONOSCOPE

MOAGAR POLADIAN Gabriel (gabim@imt.ro), PhD senior researcher

Titular: Institutul National de Cercetare – Dezvoltare pentru Microtehnologie, IMT-Bucuresti

Main features

- It allows the determination of the optical axis position in uniaxial thin films deposited on opaque substrates, the optical activity, the sign of the biaxial crystals, etc.
- It has twice the sensitivity of the transmission conoscopy
- It can be applied to both thick plate materials and thin films

Photo of an experimental model of the reflective conoscope, developed in cooperation by IMT-Bucharest and S.C. ProOptica S.A.

The apparatus allows:

- conoscopic measurements
- microscope functionality → maping the position of the optical axis across the surface of the thin film, as well as any deviation from uniaxiality
- measurement of the birefringence of the thin film
- measurement of the birefringence dispersion
- image capture on PC conected CCD

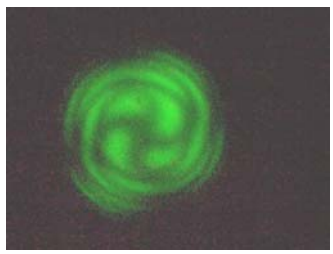


Photo of the Malta cross in a quartz sample, in monochromatic and white light respectively. The arms of the cross are curved because of the optical rotatory power of the quartz. Crystal thickness of 3.9 mm.

Applications

- Integrated optics and optoelectronics
- Integrated ferroelectrics and piezoelectrics
- Materials science and engineering
- Process monitoring in optoelectronics and integrated optics technology
- Geology and mineralogy
- Gemology
- Jewelry

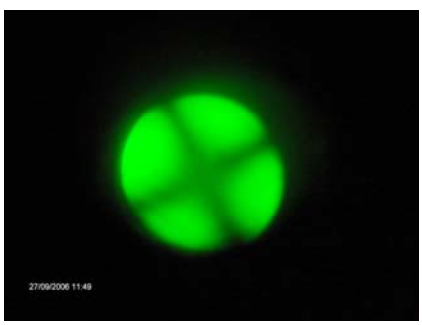


Photo of the Malta cross in a quartz sample, in monochromatic light (555 nm), for a sample with a thickness of 190 microns. The crystal is too thin for observing the bending of the cross arms.

Materials to which can be applied

- Uniaxial crystals (KDP, DKDP, $BaTiO_3$, quartz, PZT, calcite, etc.)
- Uniaxial polymers
- Liquid crystals
- Mechanically stressed materials (glasses, thin optical films, etc.)

Acknowledgements

This work is supported by the Romanian Ministry for Education and Research under the contract CEEX I 15 / 2005. It is a collaboration between IMT-Bucharest (ccordinator) and S.C. ProOptica S.A. .

Intellectual property: There are two patent applications

Medaille D'argent - Salon International des Inventions Bruxelles 2004