„Aplicatii ale nanotuburilor de carbon in realizarea de interconexiuni in circuitele integrate”

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2005 Technology Roadmap for Semiconductors (ITRS):

- Interconexiunile traditionale nu mai satisfac cerintele functionale impuse de viitoarele circuitele integrate .
- Dimensiunile critice ale tranzistoarelor sint sub **100nm** in timp ce interconexiunile au dimensiuni **micronice.**
- Cuprul care este inca solutia preferata pentru interconexiuni este susceptibil la **electromigratie** la densitati mari de curent si prezinta o **fiabilitate scazuta** atunci cand sectiunea interconexiunii scade la 100nm.
-**Rezistivitatea electrica** a cuprului creste semnificativ pentru dimensiuni nanometrice ale interconexiunii

-Datorita proprietatilor fizice exceptionale **nanotuburile de carbon** se impun in mod natural ca o solutie de inlocuire a interconexiunilor de cupru

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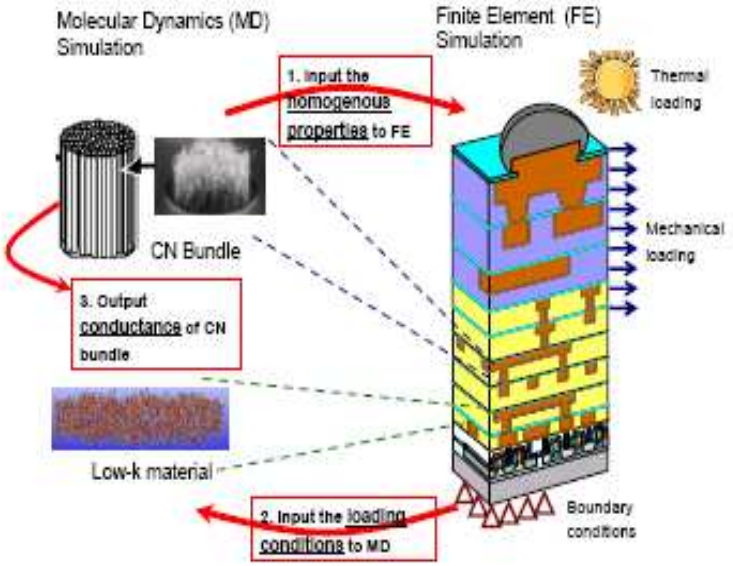
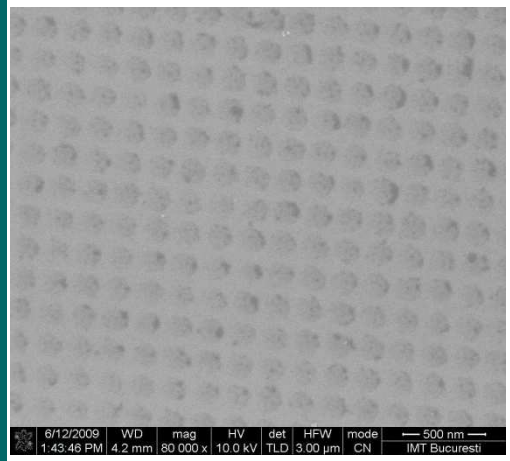
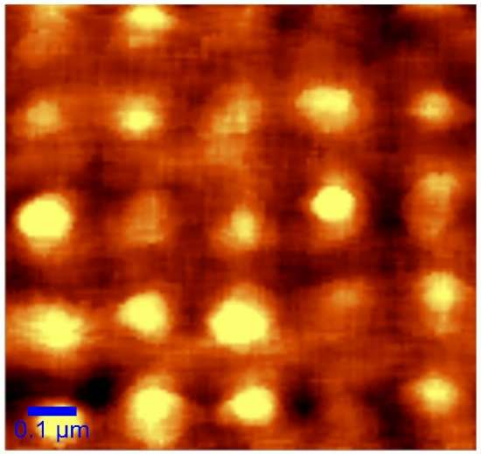


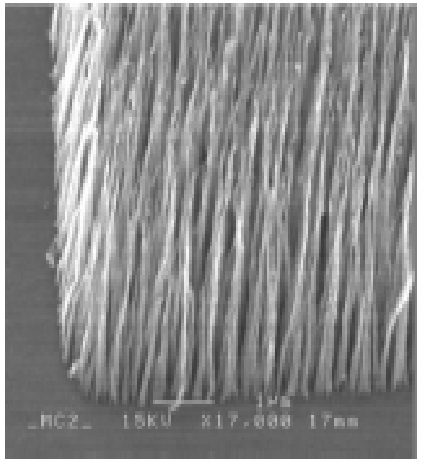
Cresterea de nantuburi de carbon pe suprafetete acoperite cu nanodoturi de Ni

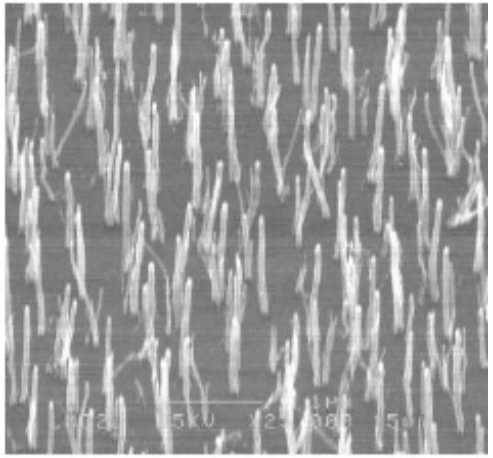


Micrografie SEm a unei suprafete cu nanodoturi (ϕ =90 nm, grosime 5nm) de Ni



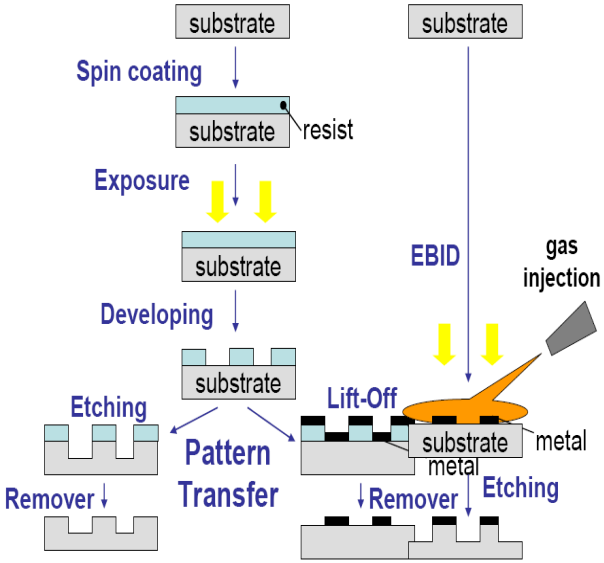
Imagine SNOM a nanodoturilor de Ni



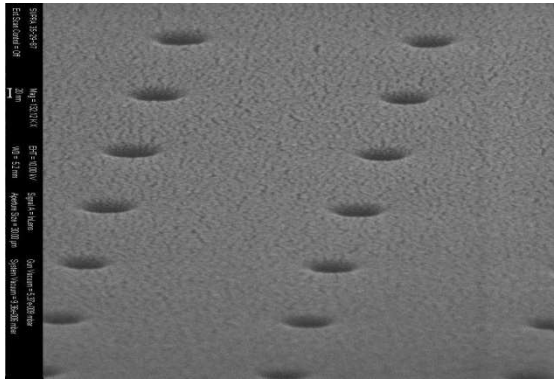


Nanotuburi si nanofibre de Carbon crescute prin CVD pe suprafete acoperite cu nanodoturi de Ni (SMOLTEK AG Suedia)

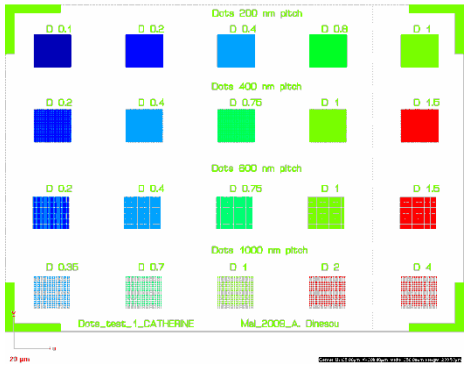
Fabricarea nanodoturilor de Ni: litografie cu fascicul de electroni si lift - off



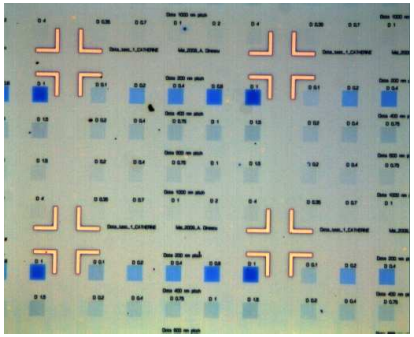
Principiul litografiei cu fascicul de electroni



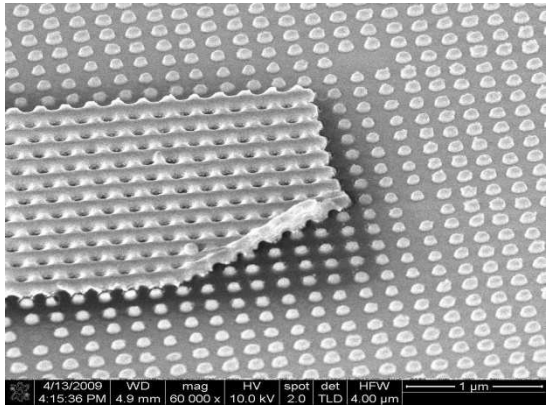
Micrografie SEM (proba inclinata la 45^0) a gaurilor in PMMA



Layout-ul structurii test

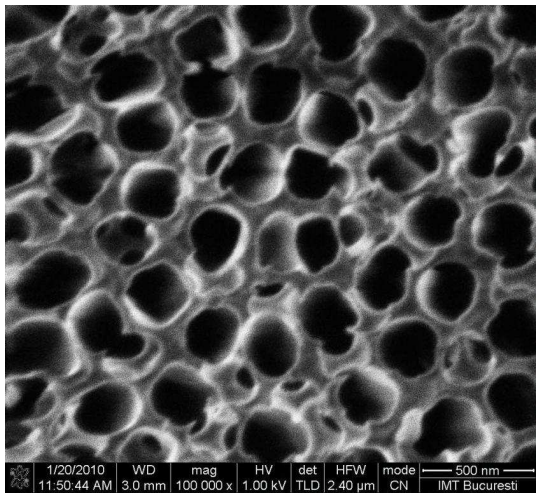


Imagine optica a layout-ului expus in PMMA

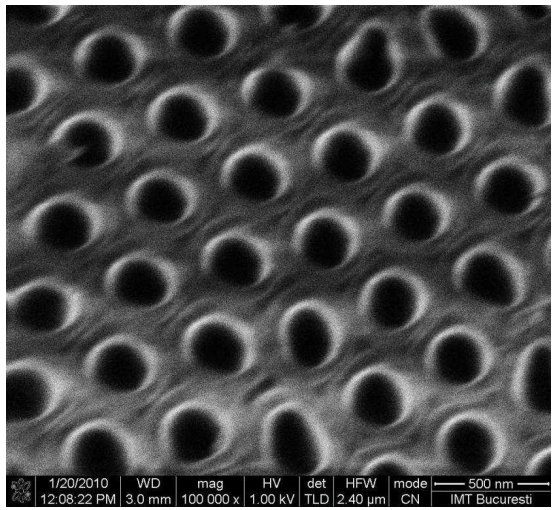


Arie acoperita cu nanodoturi de Ni dupa lift -off

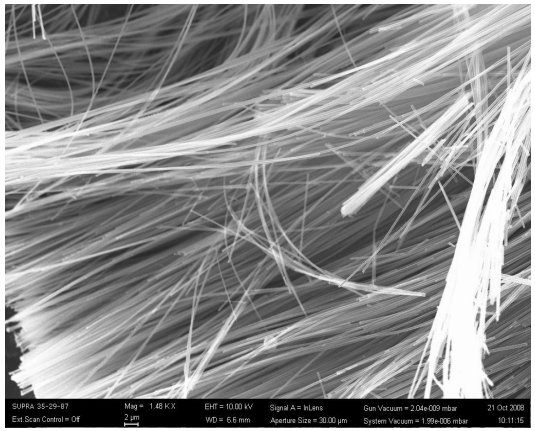
Utilizarea membranelor poroase de alumina ca sabloane pentru cresterea nanotuburilor de carbon

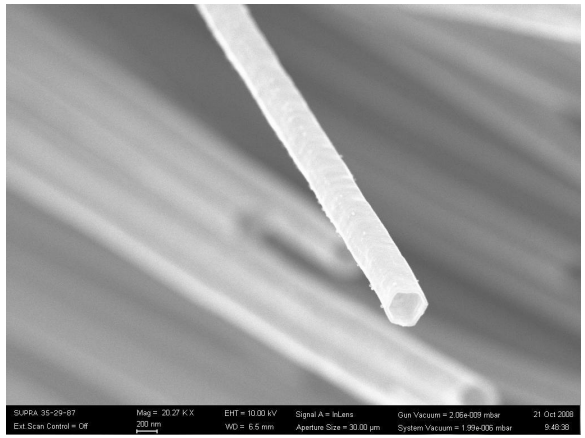


Membrana comerciala de alumina



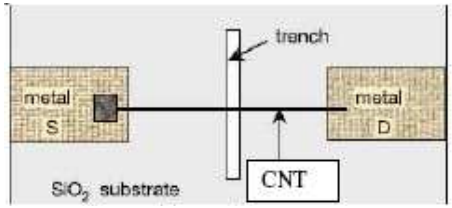
Membrana produsa de UPS Toulouse

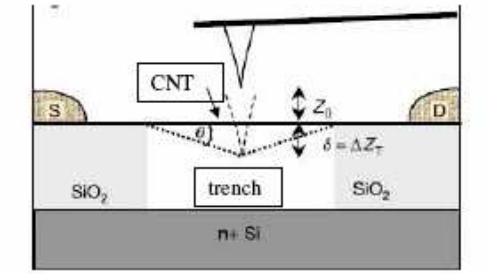




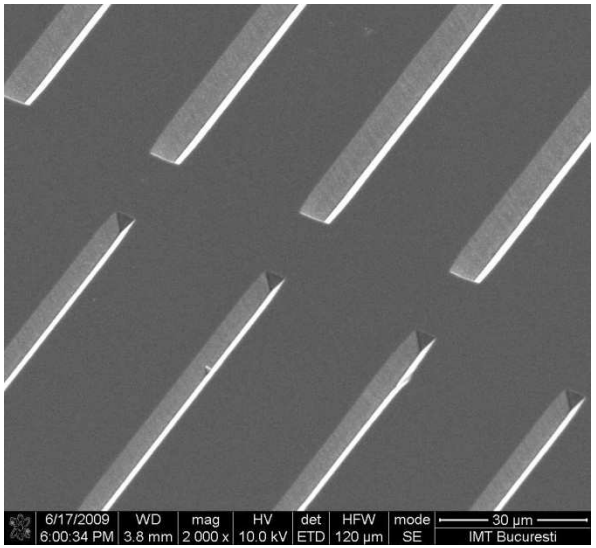
Nanotuburi de carbon crescute in porii membranei de alumina (UNISAL Italia)

Caracterizarea mecanica nanotuburilor de carbon.

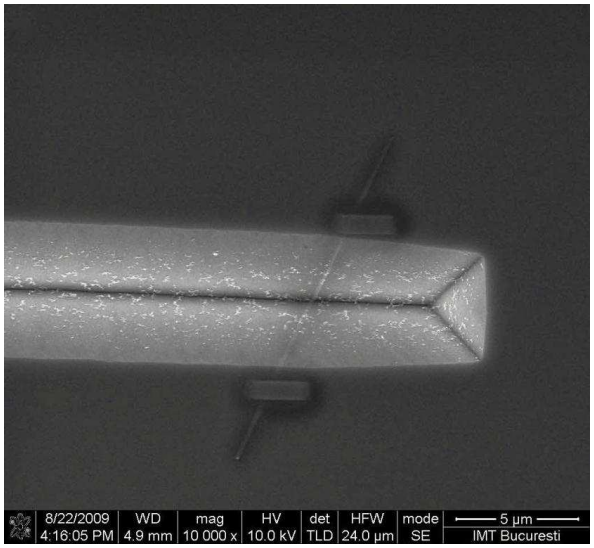




Principiul metodei de caracterizare (TUD Delft)

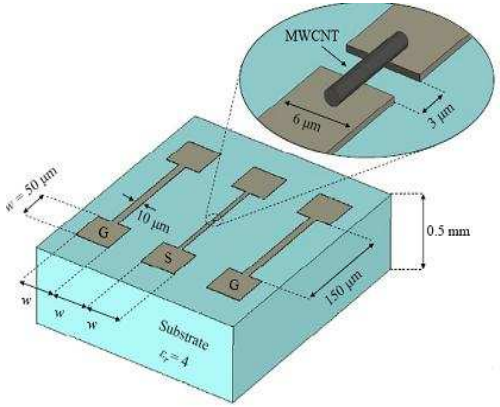


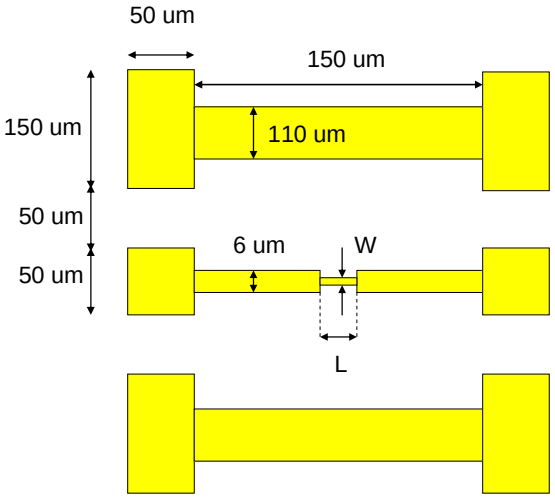
Straturi cu sectiune in V corodate in Siliciu



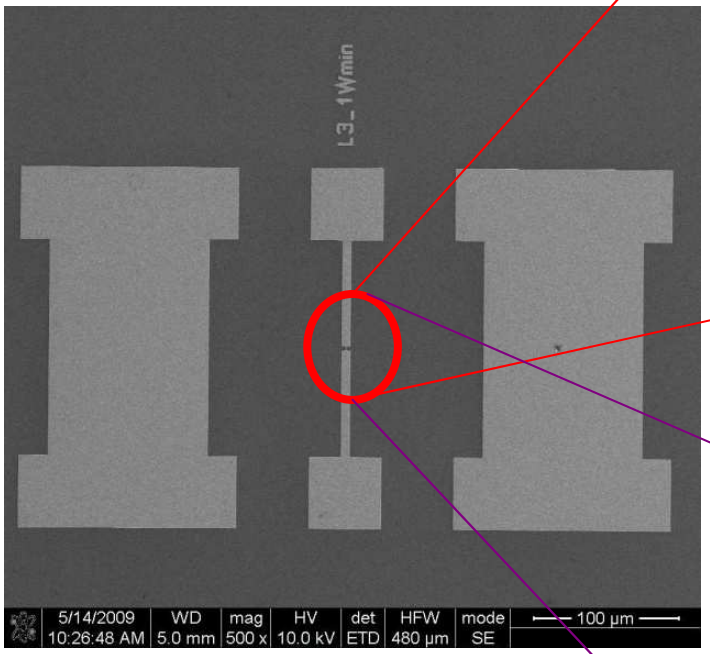
Utilizarea tehnicii EBID pentru fixarea nanotuburilor de carbon

Caracterizarea electrica a nanotuburilor de carbon.

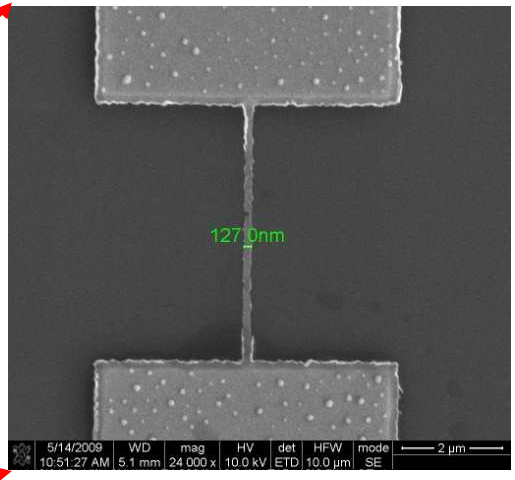


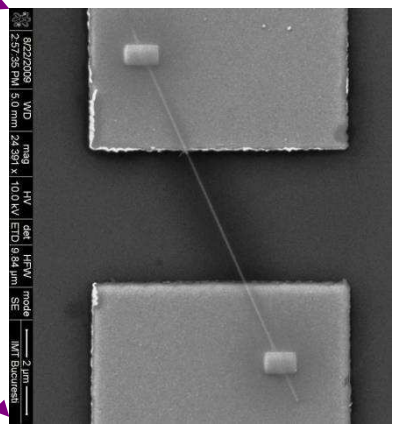


Principiul metodei de masura (Universitatea Sapienza Roma)

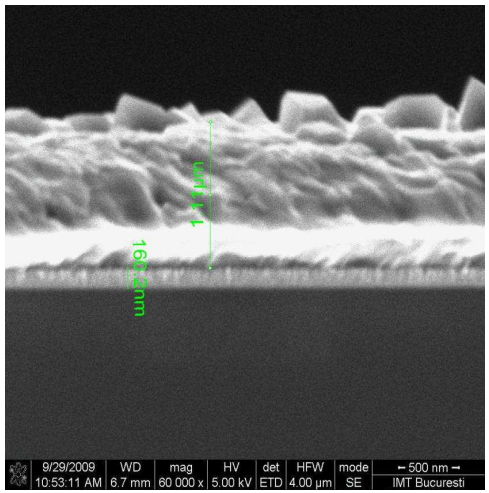


Structura de test destinata masuratorilor electrice de inalta frecventa

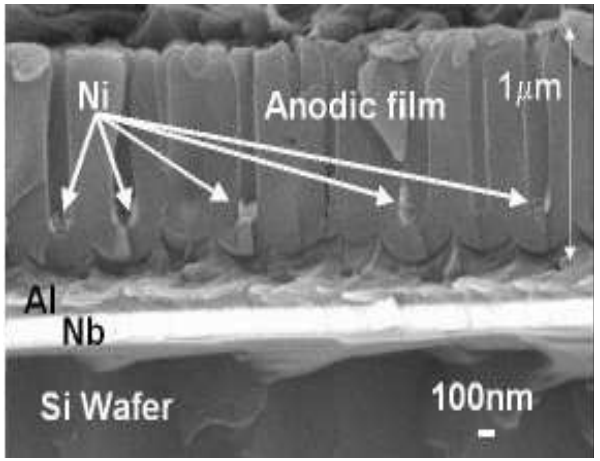




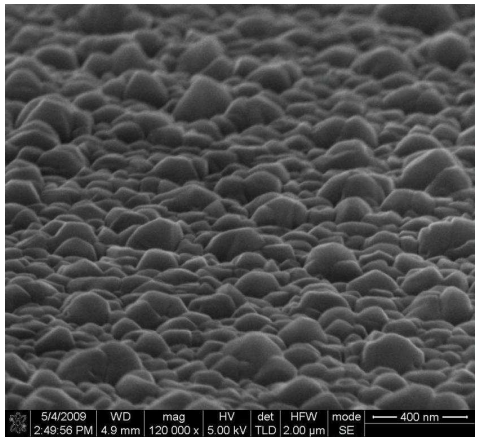
Utilizarea membranelor poroase subtiri (W≤1μm) ca sabloane pentru cresterea nanotuburilor de carbon



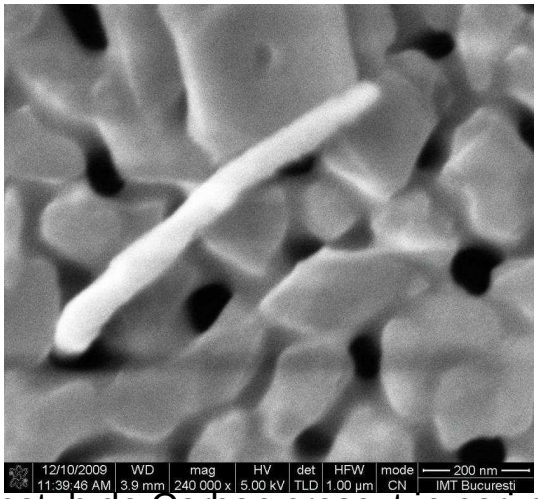
Straturi de Nb si Al depuse pe Si



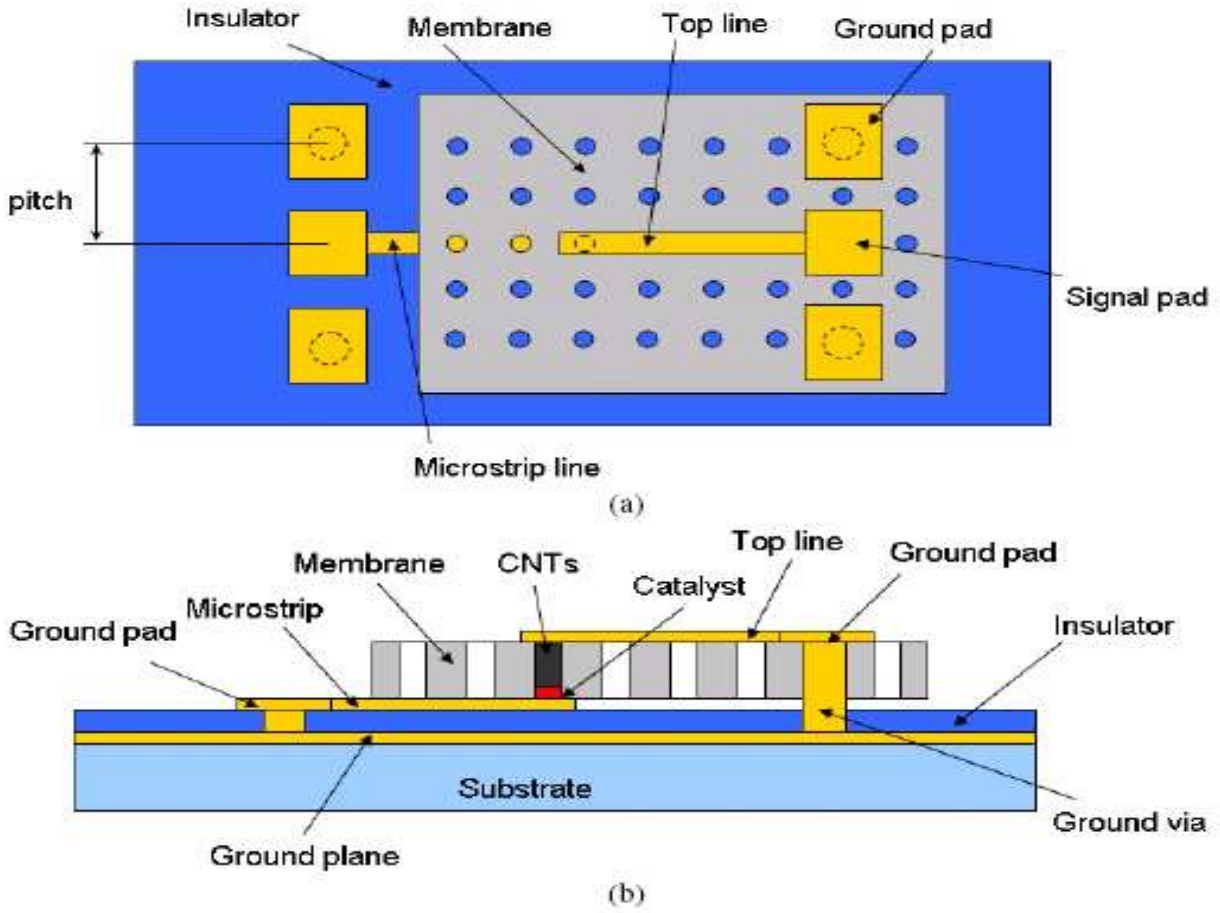
Sectiune prin membrana poroasa (UPS Toulouse)



Micrografie SEm a suprafetei de Al



Nanotub de Carbon crescut in pori membranei INFN Frascati



Structura test propusa pentru masurarea caracteristicilor electrice de inalta frecventa ale nanotuburilor destinate vias-urilor locale