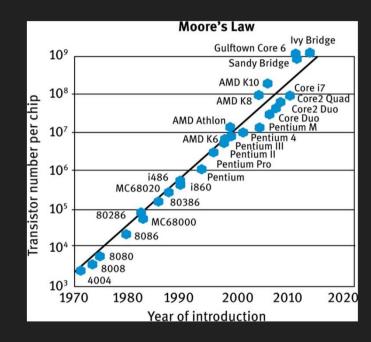
Nanostructure fabrication methods

AUTORES

Enrique Quiñones Paricio Francisco Gimeno Hernández Jaume Francesc Roig Marmaneu

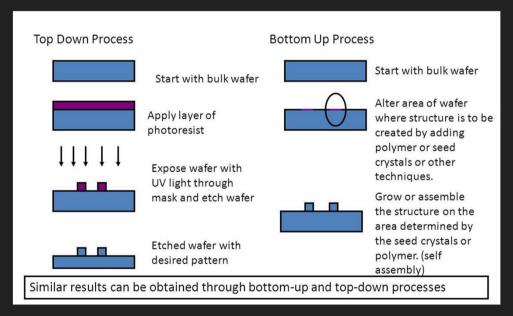
INTRODUCTION

In the last centuries, our community has developed from agrarian over industrial to a worldwide information society. The driving force and one of the most important economic component of our community is a nanostructure called microchip. According to the Moore's law, the standard microelectronics (CMOS technology) the number of transistors per unit area doubles every 2 years and will come to its limits in the next years (2020). This puts a number of technological challenges so we have developed different fabrication methods.



INTRODUCTION

The nanostructure fabrication methods can be differentiated by "bottom-up" methods or by "top-down" methods:



MILLING

CONVENTIONAL LITHOGRAPHY

PHOTOLITHOGRAPHY

SCANNING LITHOGRAPHY

SOFT LITHOGRAPHY

NANOSPHERE LITHOGRAPHY

COLLOIDAL LITHOGRAPHY

SCANNING PROBE LITHOGRAPHY

MILLING

CONVENTIONAL LITHOGRAPHY

PHOTOLITHOGRAPHY

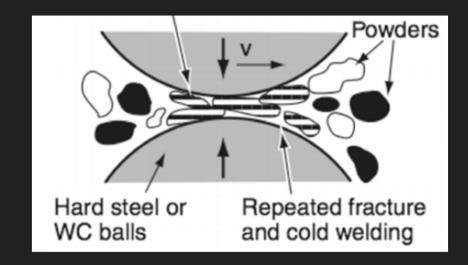
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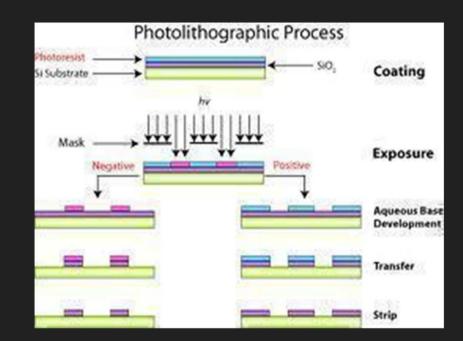
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SOFT LITHOGRAPHY

NANOSPHERE LITHOGRAPHY

COLLOIDAL LITHOGRAPHY

SCANNING PROBE LITHOGRAPHY



MILLING

Focused ion beam lithography

CONVENTIONAL LITHOGRAPHY

PHOTOLITHOGRAPHY

SCANNING LITHOGRAPHY

SOFT LITHOGRAPHY

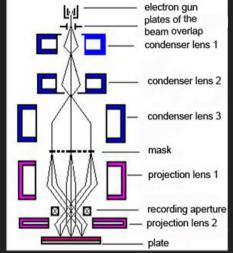
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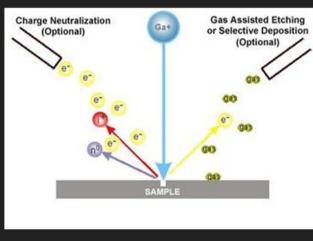
COLLOIDAL LITHOGRAPHY

SCANNING PROBE LITHOGRAPHY

WRITING "ATOM BY ATOM"

E-beam lithography





MILLING

CONVENTIONAL LITHOGRAPHY

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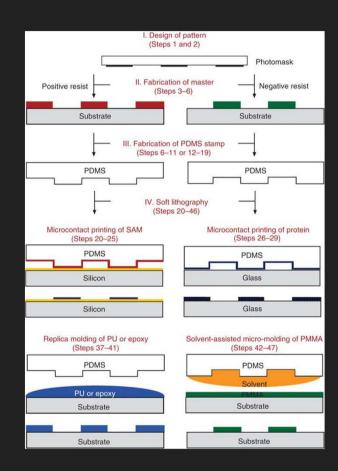
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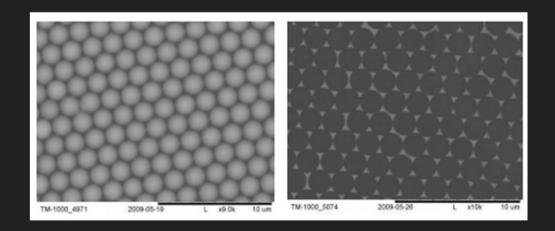
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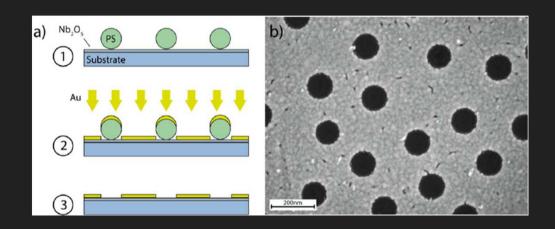
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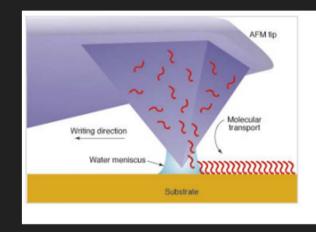
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NANOSPHERE LITHOGRAPHY

COLLOIDAL LITHOGRAPHY

SCANNING PROBE LITHOGRAPHY

WRITING "ATOM BY ATOM"



As soon as I mention this, people tell me about miniaturization, and how for it has progressed today. They tell me about electric motors that are the size of the natl or your small finger. And there is a device on the market, they tell me, by which you can write the Lord's Prayer on the head of a pin. But that's nothing! that's the mas primitive, halting step in the direction I intend to discuss. It is a staggeringly small world that is below. In the year 2009, when they look back at this age, they will wonder why it was not until the year 1950 that anybody began seriously to move in this direction.

Richard P. Feynman, 1950

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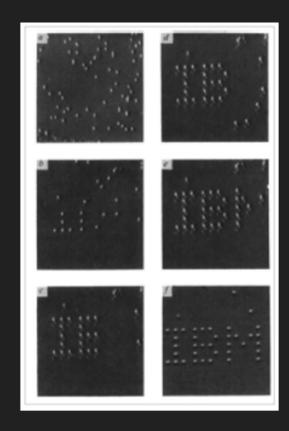
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SCANNING PROBE LITHOGRAPHY



GAS-PHASE METHODS

PLASMA ARCING

CHEMICAL VAPOUR DEPOSITION

MOLECULAR BEAM EPITAXY (MBE)

LIQUID-PHASE METHODS

SOL-GEL SYNTHESIS

GAS-PHASE METHODS

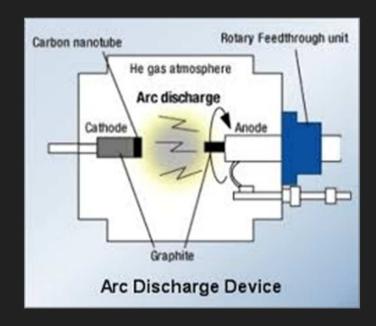
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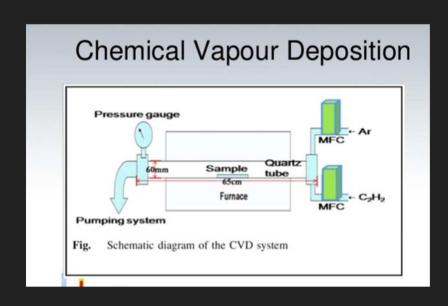
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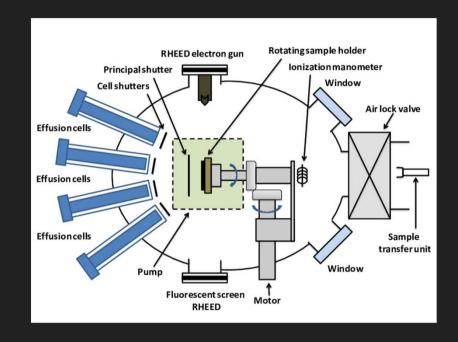
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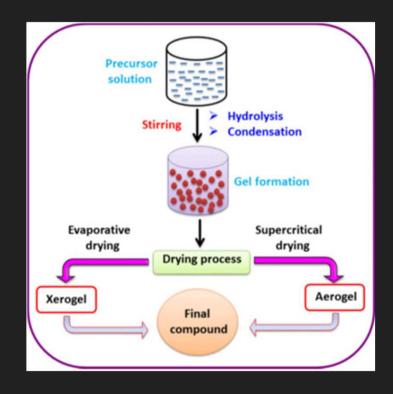
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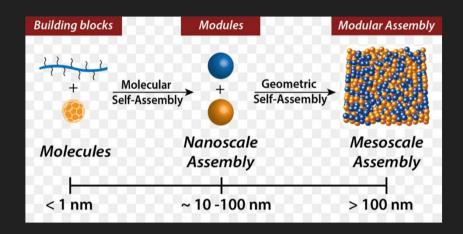
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REFERENCES

Nanostructure Fabrication Methods

Nanostructure fabrication methods UJI

NANOYOU - Chapter 7: Fabrication methods