

Scanning probe nano lithography or (SPL) in the range (below 20 nanometers)

Afshin Rashid¹

¹Affiliation not available

September 09, 2024

Note: The tip of a Scanning Tunneling Microscope (STM) or Atomic Force Microscope (AFM) offers not only the ability to image down to atomic resolution, but also the capabilities of nanostructures with such excellent resolution. A paradigmatic example is the fabrication of a furnace furnace by manipulating individual atoms on a surface using STM. Although the speed of making such a thing has recently improved, it is a process with great difficulties in scaling and integrating with the semiconductor industry.

The use of AFM for scanning probe lithography also suffers from power-related problems, but it is better suited than STM for this task due to the less stringent requirements of the technique: no very high vacuum conditions. , conductive surface or very good tip-to-sample distance control is required. Scanning probe nanolithography based on AFM can be performed through different mechanisms and offers a wide range of possibilities . Therefore, the AFM tip can produce localized changes in the composition, height, or physical/chemical properties of surfaces through thermal effects, mechanical effects, deposition, chemical effects, etc. The principle of this technique for making electronic nano devices has been drawn and the example of making Si nanowires based on the oxidation of nanolithography probe Scanning is done. A derived technique that has become very popular is dip-pen nanolithography, in which the tip deposits specific inks with excellent clarity at desired locations.

Figure 1: Scanning probe nano lithography

Actually, by scanning probe nanolithography the design of a process based on atomic force-microscope called oxidation nanolithography in the manufacture of devices such as /span> are very slow in nature, but their combination with other techniques Lithographs in large areas can be very interesting for prototyping or applications in the manufacture of electronic nano devices.scanning probe nanolithographyTechniques is excellent and achievable, in that it can be atomically separated by this process in many experiments. Specially suitable.Scanning probe nanolithography based on necessity according to the type of substrate, environmental conditions, lithography driving force (thermal, mechanical, oxidation, deposition, etc.), the absence of physical masks and etc. is flexible.Nanolithography probe scanTechniques Generally Resolution below 20 nm can be achieved by the more usual method by AFM.Si nanowires of various shapes with resolution below 20 nm (scale bar 100 nm except

in the central image) were fabricated using this scanning probe lithography method.

Conclusion :

The tip of a scanning tunneling microscope (STM) or atomic force microscope (AFM) offers not only the ability to image down to atomic resolution, but also the capabilities of nanostructures with such excellent resolution. A paradigmatic example is the fabrication of a furnace furnace by manipulating individual atoms on a surface using STM. Although the speed of making such a thing has recently improved, it is a process with great difficulties in scaling and integrating with the semiconductor industry.

(Simpson, 2024)

(Almeida, 2024)

(Gonzales, 2024)

(Gonzales, 2024)

(Rechber, 2024)

References

Review of: “Nano System is a function at the molecular scale”. (2024). *Qeios*. <https://doi.org/10.32388/tbvkfi>

Review of: “The length-to-diameter ratio of nanotubes is about 1000 and they can be considered as almost one-dimensional structures. Nanotubes, like graphite, are fully formed”. (2024). *Qeios*. <https://doi.org/10.32388/50f2u6>

Review of: “The range of activity of nanoparticles depends on the nature and shape of the nanostructure”. (2024). *Qeios*. <https://doi.org/10.32388/t6xlim>

Review of: “Since carbon nanotubes are able to pass electric current through the ballistic transfer of electrons without friction from their surface”. (2024). *Qeios*. <https://doi.org/10.32388/tdsptz>