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خلاصه مقاله:

The recent decade has seen a huge impact of nanotechnology in different sciences. In analytical chemistry, nanomaterials have been utilized for various purposes from sample preparation to detection. The impact of nanotechnology in analytical science is not limited to the improvement of analytical methodologies. Nanomaterials have been utilized for nanomaterials analysis as nanotools. Nanotools are used to investigate and work with materials at the nanoscale. Nanotechnology has also enabled new applications such as nanoscale tips used for topological microscopy in atomic force microscopy, scanning tunneling microscopy, and magnetic force microscopy. These techniques utilize nanotechnology to improve their efficiency. Furthermore, nanotechnology has enabled the construction of tweezers and robots in the nanoscale. These nano-enabled tools (nanotools) have been successfully utilized for nanoanalysis and nanomanipulation. atomic force microscopy, scanning tunneling microscope, and magnetic force microscopy are not only meant to image nanostructured surfaces but also they are utilized for the manipulation of materials at the atomic and nanoscale. Nanotweezers, nanorobots, and laser tweezers using nanoapertures are also able to manipulate nano and microscale materials. This paper reviews the principles and application of the mentioned nano-enabled techniques as nanotools in analytical chemistry with a focus on nanomaterials nanoanalysis and nanomanipulation as nanoanalytes.

كلمات کلیدی:

Atomic force microscopy, Scanning tunneling microscope, Magnetic force microscopy, Nanotweezers, Nanorobotics, Nanoapertures

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