Review of: "Micro and nano-electromechanical systems (MEMS / NEMS) are devices in which the physical motion of a micro- or nano-scale structure is controlled by an electronic circuit"

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Potential competing interests: No potential competing interests to declare.

> ***Note: MEMS / NEMS devices enable precise control of these nanoscale interactions and provide an ideal platform for interaction with the nanoscale world. It involves the integration of sub-micron-active materials and elements that combine mechanical, optical and electrical signals to produce nanostructured structures.***

Micro and nano-electromechanical systems (MEMS / NEMS) are devices in which the physical motion of a micro or nano-scale structure is controlled by an electronic circuit or vice versa. MEMS and NEMS can be used to build sensitive sensors and stable timing devices. Nano System Nano System is a function at the molecular scale. This includes both current work and more advanced concepts. In its core meaning, nanotechnology refers to the predicted ability to make items from the bottom up, using techniques and tools that are produced to make complete, high-performance products. Nano System Nano System Introduced the idea of nano-scale "assembly" that could make its own copy. Other aspects of the desired complexity with atomic control in Nano Systems Nano Systems are very widespread and practical. Nanocomputers and nanoassemblers are also a subset of Nano Systems. Nanoparticles are the main components of all nanosystems. To produce nanoparticles with the help of nanotechnology, changes can be made in atoms by controlling the properties. When materials are studied at the nanoscale, the reactions and behavior of atoms are compared to those at the molecular level. They are completely different because in this realm the physical properties of the material change. It is like throwing a ball in one chamber and taking another ball out of that chamber. The difference in the nano realm is such that even the color, melting point, chemical properties, etc. of materials outside this range are quite different.Objectives The development of nano-electromechanical systems (NEMS) devices made entirely of (crystalline) metal oxides, a class of compounds that demonstrate a wide range of physical properties, built with the prospect of introducing new classes of converters with mechanisms No history of detecting and integrating more capabilities in nanomechanical systems. This new technology approach will add multipurpose oxides to the current MEMS / NEMS field set. The advancement of science to our technology is the realization of the concept of the NEMS device based on super-sensitive oxides for the detection of

biomagnetic fields. The MEMS / NEMS field set will implement hypersensitive detectors capable of measuring very weak magnetic fields that target magnetic fields generated by human brain activity for tens of times the MEMS / NEMS field set .Nano- and micro-electromechanical systems and precision measuring instruments (various industry modes), high-performance computers used in the design of software and effective computing environments . The design of micro-nanoscale systems prepares subsystems, devices and structures to integrate new phenomena and complex processes without unifying them and regular collaborations . Microelectromechanical systems (MEMS) are a combination of mechanical elements, sensors, actuators, and silicon-based nanoelectronic devices made by nanotechnology. As long as electronic devices are made for use in the process of integrated circuits (ICs) (such as process Components), "BICMOS, Bipolar, CMOS Micromechanical fabrication " for use in micro- machining processes, suitable for selectively part-by-part with silicone tablets or the addition of new building layers to form mechanical devices Used mechanically, are made.Microelectronic integrated circuits can be considered as the thinking brain of a system, and MEMS has enhanced this decision-making capability with eyes and arms to allow micro-systems to allow the environment to be measured by mechanical, temperature, biological, chemical, and optical measurements. And collect magnets. The electronics then instruct the arms to display the information taken from the sensors and through some decisions to react by moving, stabilizing, adjusting, pumping and filtering . As a result, the environment is controlled for the desired demands . At each level of the design hierarchy, the efficiency of the system in the realm of its behavior for evaluation, optimization and Correction of the optimization and composition process is used to find new solutions. ICs must meet the performance characteristics of MEMS, such as electromagnetic-based electromechanical instrumentation and structures , input-output channels, analog-to-digital conversions, and analog-to-analog data.

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Microelectromechanical systems (MEMS) have proven successful in making nanosystems and nanostructures smaller, faster, and cheaper. Today's MEMS devices, typically made to micron (10 to 6 nanometers) in size, include airbag accelerometers, pressure sensors, and microfluidic devices that can separate and decompose very small amounts of chemicals. To analyze. At present, with nanotechnology capabilities, nanoelectromechanical systems (NEMS) are being developed as mass detectors capable of weighing single molecules. As high frequency amplifiers with sensitivity up to one billion cycles per second. As ultra-fast and low-power switches; And as integrated microfluidic devices capable of isolating, manipulating, and analyzing individual human cells. At the nanoscale, normal interactions such as surface tension are also possible.NEMS through nanoelectronics in systems that are classified for defense, pharmaceutical, medical, electronic and telecommunication applications, etc. NEMS current that includes acceleration gauges are, chip display projection, the drone sensors, optical switches, Microvalve and bio-sensors and micro-multifunction chips used

in nano-volumes are produced. NEMSs are integrated into moving microstructures (with electromechanical components), sensors, actuators, radiant energy devices, and microelectronics. These NEMSs can be built for use in various microstructure technologies such as micromachines . Basic technology in the construction of NEMS , CMOS And biCOMS (for making ICs) and micro-machines (for generating motion and radiance and radiating energy to micron- scale devices and structures). This is one of the main objectives of microelectronic devices and structures with micro- machines, mechanical, electromechanical, the complex has NEMS are integrated and high-efficiency work. To ensure high performance, workability, reliability and buildability, bulk manufacturing processes based on CMOS are well developed and should be modified and enhanced.

> ***Conclusion :***
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> ***MEMS / NEMS devices enable precise control of these nanoscale interactions and provide an ideal platform for interaction with the nanoscale world. It involves the integration of sub-micron-active materials and elements that combine mechanical, optical and electrical signals to produce nanostructured structures.***

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References

1. ^*Lei Choe. (2024). Review of: "The field-effect tunneling transistor nMOS, as an alternative to conventional CMOS by enabling the voltage supply (VDD) with ultra-low power consumption,". Qeios. doi:10.32388/z3oxov.*
2. ^*Afshin Rashid. (2024). Review of: "transistor nMOS (with ultra-low power consumption, energy-efficient computing, during the sub-threshold range)". Qeios. doi:10.32388/1al4jb.*
3. ^*Afshin Rashid. (2023). Review of: "High speed (doping) nMOS graphene transistor in p- and n-doping electronic circuits (positive and negative)". Qeios. doi:10.32388/jreu5m.*
4. ^*Erkan Ozturk. (2023). Review of: "(Nano transistor) Electronic and biological nanotechnology (Structure, internal building)". Qeios. doi:10.32388/bt5z8a.*
5. ^*Linda Brouce. (2023). Review of: "(Field effect nano transistors) Nano transistor electronic quantity".Qeios. doi:10.32388/12sgvj.*
6. ^*Afshin Rashid. (2024). Review of: "Nano supercapacitors (supercapacitors or electrochemical nanocapacitors)". Qeios. doi:10.32388/67gwcf.*
7. ^*Afshin Rashid. (2024). Review of: "FinFET nanotransistor downscaling causes more short channel effects, less gate control, exponential increase in leakage currents, drastic process changes and unmanageable power densities". Qeios. doi:10.32388/hx4oyk.*
8. ^*Chad Allen. (2024). Review of: "FinFET nanotransistor, the reduction of scale causes more short channel effects, less*

gate control, an exponential increase in leakage currents, severe process changes, and power densities". Qeios. doi:10.32388/h3qk7b.

9. ^Afshin Rashid. (2023). Review of: "Nano electrical memories and testing Nickel nanoparticles NI_nanoparticle Strong conductors of electric current". Qeios. doi:10.32388/sbe8l8.
10. ^Afshin Rashid. (2023). Review of: "Reproduction (electrical nano memories) by the method combined nanolithography (١٢ V), Fast switching speed (١ microsecond)". Qeios. doi:10.32388/jg1x8x.
11. ^Afshin Rashid. (2023). Review of: "Experiment (nanoelectronic memory) using small organic molecules Chlorophyll pseudo instead of charge storage capacitors". Qeios. doi:10.32388/k0x2ro.
12. ^Marcus Webster. (2024). Review of: "Graphene molecular nanomemories show unique electronic properties, and their small dimensions, structural strength, and high performance make them a charge storage medium for Nano memory applications". Qeios. doi:10.32388/a6k2u7.
13. ^Anita Gupta. (2023). Review of: "Amplification of Nano Wires Nano Wire by Electron Nano Lithography".Qeios. doi:10.32388/l3md1n.
14. ^Cita O,brain. (2023). Review of: "The changes in the width of the nano transistor channel due to the field effect of the gate around can cause undesirable changes and loss of mobility". Qeios. doi:10.32388/5pfxk9.
15. ^Afshin Rashid. (2023). Review of: "(Field effect nano transistors) Nano transistor electronic quantity and ionization potential)". Qeios. doi:10.32388/464lg7.
16. ^Afshin Rashid. (2023). Review of: "The concept of (Nano assembler) in smart electronic nano structures".Qeios. doi:10.32388/atyte1.
17. ^Afshin Rashid. (2023). Review of: "Oligophenylene vanillin (silicon/germanium) structured nanowires and cylinders for possible applications in electronic energy". Qeios. doi:10.32388/i5wrmf.
18. ^Afshin Rashid. (2023). Review of: "Propagation of Oligophenylene vanillin nanowires by focused ion beam (FIB) nanolithography method (below ١٠٠ nm - ١٠ nm range)". Qeios. doi:10.32388/whhfa8.
19. ^Afshin Rashid. (2023). Review of: "Nano wire immersion method (structure and function)".Qeios. doi:10.32388/0od0gl.
20. ^Carlos Sanchez. (2023). Review of: "Oligophenylene vanillin (silicon/germanium) structure". Qeios. doi:10.32388/59igyk.
21. ^Andria Pandich. (2023). Review of: "Nano wire immersion method (structure and performance)".Qeios. doi:10.32388/efe18p.
22. ^Andrea County. (2023). Review of: "The concept of (Nano assembler)". Qeios. doi:10.32388/xrrt0e.
23. ^Luola Sendros. (2024). Review of: "nMOS instead of exhibiting thermionic emission modulation, changes through a quantum tunnel modulation 12> They change through a dam.". Qeios. doi:10.32388/5sdms6.
24. ^Lucas Jeferson. (2024). Review of: "Graphene in nMOS field-effect transistors". Qeios. doi:10.32388/1aozqy.