

**CROSS-REFERENCE ART COLLECTIONS****700 NANOSTRUCTURE**

- 701 .Integrated with dissimilar structures on a common substrate
- 702 ..Having biological material component
- 703 ...Cellular
- 704 ..Nucleic acids (e.g., DNA or RNA, etc.)
- 705 ...Protein or peptide
- 706 ...Carbohydrate
- 707 ..Having different types of nanoscale structures or devices on a common substrate
- 708 ..With distinct switching device
- 709 ...Including molecular switching device
- 710 ....Biological switching
- 711 ....Nucleic acid switching
- 712 ..Formed from plural layers of nanosized material (e.g., stacked structures, etc.)
- 713 ...Including lipid layer
- 714 ...Containing protein
- 715 ..On an organic substrate
- 716 ...Biological cell surface
- 717 ...Lipid substrate
- 718 ...Carbohydrate substrate
- 719 ...Nucleic acid substrate
- 720 ..On an electrically conducting, semi-conducting, or semi-insulating substrate
- 721 ...On a silicon substrate
- 722 ...On a metal substrate
- 723 ..On an electrically insulating substrate
- 724 .Devices having flexible or movable element
- 725 ..Nanomotor/nanoactuator
- 726 ...Using chemical reaction/ biological energy (e.g., ATP, etc.)
- 727 ..Formed from biological material
- 728 ...Nucleic acids (e.g., DNA or RNA, etc.)
- 729 ...From protein or unit thereof (e.g., enzyme or carboxyl group, etc.)
- 730 ...For electrical purposes
- 731 ..Formed from a single atom, molecule, or cluster
- 732 ..Nanocantilever
- 733 ..Nanodiaphragm
- 734 .Fullerenes (i.e., graphene-based structures, such as nanohorns, nanococoons, nanoscrolls, etc.) or fullerene-like structures (e.g., WS<sub>2</sub> or MoS<sub>2</sub> chalcogenide nanotubes, planar C<sub>3</sub>N<sub>4</sub>, etc.)
- 735 ..Carbon buckyball (C<sub>60</sub>, C<sub>70</sub>, etc., and derivatives and modifications thereof)
- 736 ...Having atoms interior to the carbon cage
- 737 ...Having a modified surface
- 738 ...Modified with biological, organic, or hydrocarbon material
- 739 ....Modified with an enzyme
- 740 ...Modified with atoms or molecules bonded to the surface
- 741 ...Modified with dissimilar atom or molecule substituted for carbon atoms of the buckyball (e.g., impurity doping or compositional substitution, etc.)
- 742 ..Carbon nanotubes (CNTs)
- 743 ...Having specified tube end structure (e.g., close-ended shell or open-ended tube, etc.)
- 744 ...Having atoms interior to the carbon cage
- 745 ...Having a modified surface
- 746 ...Modified with biological, organic, or hydrocarbon material
- 747 ....Modified with an enzyme
- 748 ...Modified with atoms or molecules bonded to the surface
- 749 ...Modified with dissimilar atoms or molecules substituted for carbon atoms of the CNT (e.g., impurity doping or compositional substitution, etc.)
- 750 ...Single-walled

751	....With specified chirality and/ or electrical conductivity (e.g., chirality of (5,4), (5,5), (10,5), etc.)	770	....Formed with polyamide polymers
752	...Multi-walled	771	...Nanoring
753	..With polymeric or organic binder	772	....Formed from circular biomolecule (e.g., DNA, heme, chelators, etc.)
754	.Dendrimer (i.e., serially branching or "tree-like" structure)	773	.Nanoparticle (structure having three dimensions of 100 nm or less)
755	.Nanosheet or quantum barrier/ well (i.e., layer structure having one dimension or thickness of 100 nm or less)	774	..Exhibiting three-dimensional carrier confinement (e.g., quantum dots, etc.)
756	..Lipid layer	775	..Nanosized powder or flake (e.g., nanosized catalyst, etc.)
757	...Layer containing protein	776	...Ceramic powder or flake
758	..Mono-atomic layer on delta- doped sheet	777	...Metallic powder or flake
759	..Quantum well dimensioned for intersubband transitions (e.g., for use in unipolar light emitters or quantum well infrared photodetectors, etc.)	778	.Within specified host or matrix material (e.g., nanocomposite films, etc.)
760	..Superlattice with graded effective bandgap (e.g., "CHIRP-graded" superlattice, etc.)	779	..Possessing nanosized particles, powders, flakes, or clusters other than simple atomic impurity doping
761	..Superlattice with well or barrier thickness adapted for increasing the reflection, transmission, or filtering of carriers having energies above the bulk-form conduction or valence band energy level of the well or barrier (i.e., well or barrier with $n \geq \text{carrier}/4$ thickness)	780	..Possessing fully enclosed nanosized voids or physical holes
762	.Nanowire or quantum wire (axially elongated structure having two dimensions of 100 nm or less)	781	..Possessing nonosized surface openings that extend partially into or completely through the host material
763	..Formed along or from crystallographic terraces or ridges	782	..Possessing nanosized physical convexity, ridge, or protrusion extending upward from the host's surface
764	..With specified packing density	783	..Organic host/matrix (e.g., lipid, etc.)
765	..With specified cross-sectional profile (e.g., belt-shaped, etc.)	784	..Electrically conducting, semi- conducting, or semi-insulating host material
766	..Bent wire (i.e., having nonlinear longitudinal axis)	785	..Electrically insulating host material
767	...Mesh structure	786	..Fluidic host/matrix containing nanomaterials
768	...Helical wire	787	...Viscous fluid host/matrix containing nanomaterials
769	....Formed with nucleic acid	788	.Of specified organic or carbon- based composition
		789	..In array format
		790	...With heterogeneous nanostructures
		791	....Molecular array
		792	....Nucleic acid array (e.g., human genome array, etc.)

793	.....Protein array	822	...Boron-containing compounds
794	....Chemical library array	823	...Tl-containing or Bi-containing compounds
795	..Composed of biological material	824	..Group II-VI nonoxide compounds (e.g., $Cd_xMn_yTe$ , etc.)
796	...For electrical or electronic purpose	825	..Heterojunction formed between semiconductor materials that differ in that they belong to different periodic table groups (e.g., Ge (Group IV) - GaAs (Group III-V) or InP (group III-V) - CdTe (Group II-VI), etc.)
797	..Lipid particle	826	..Nonstoichiometric semiconductor compounds (e.g., $III_xV_y$ ; x does not equal y, etc.)
798	...Having internalized material	827	.Formed from hybrid organic/inorganic semiconductor compositions
799	....Containing biological material	828	..Biological composition interconnected with inorganic material
800	.....Nucleic acid (e.g., DNA or RNA, etc.)	829	..Organic or biological core coated with inorganic shell
801	.....Drug	830	..Inorganic core or cluster coated with organic or biological shell
802	..Virus-based particle	831	.Of specified ceramic or electrically insulating compositions
803	..Containing biological material in its interior	832	.Having specified property (e.g., lattice-constant, thermal expansion coefficient, etc.)
804	....Containing nucleic acid	833	..Thermal property of nanomaterial (e.g., thermally conducting/insulating or exhibiting Peltier or Seebeck effect, etc.)
805	....Containing drug	834	..Optical properties of nanomaterial (e.g., specified transparency, opacity, or index of refraction, etc.)
806	...With exterior chemical attachment	835	..Chemical or nuclear reactivity/stability of composition or compound forming nanomaterial
807	....Exterior attachment for detection	836	...Having biological reactive capability
808	....Exterior attachment for targeting (e.g., drug targeting, etc.)	837	..Piezoelectric property of nanomaterial
809	..Organic film on silicon	838	..Magnetic property of nanomaterial
810	.Of specified metal or metal alloy composition	839	<b>MATHEMATICAL ALGORITHMS, E.G., COMPUTER SOFTWARE, ETC., SPECIFICALLY ADAPTED FOR MODELING CONFIGURATIONS OR PROPERTIES OF NANOSTRUCTURE</b>
811	.Of specified metal oxide composition (e.g., conducting or semiconducting compositions such as ITO, ZnOx, etc.)		
812	..Perovskites and superconducting composition (e.g., $BaxSr_{1-x}TiO_3$ , etc.)		
813	.Of specified inorganic semiconductor composition (e.g., periodic table group IV-VI compositions, etc.)		
814	..Group IV based elements and compounds (e.g., $CxSiyGez$ , porous silicon, etc.)		
815	..Group III-V based compounds (e.g., $AlaGabIncNxPyAsz$ , etc.)		
816	...III-N based compounds (e.g., $AlxGayInzN$ , etc.)		
817	....High-indium-content InGaN pooling or clusters		
818	...III-P based compounds (e.g., $AlxGayInzP$ , etc.)		
819	...III-As based compounds (e.g., $AlxGayInzAs$ , etc.)		
820	...III-Sb based compounds (e.g., $AlxGayInzSb$ , etc.)		
821	..Mixed group V compounds (e.g., $III-N_xPy$ , etc.)		

840	<b>MANUFACTURE, TREATMENT, OR DETECTION OF NANOSTRUCTURE</b>	871	...With environmental regulation means
841	.Environmental containment or disposal of nanostructure material	872	...Positioner
842	.For carbon nanotubes or fullerenes	873	...Tip holder
843	..Gas phase catalytic growth (i.e., chemical vapor deposition)	874	...Probe tip array
844	..Growth by vaporization or dissociation of carbon source using a high-energy heat source (e.g., electric arc, laser, plasma, e-beam, etc.)	875	...With tip detail
845	..Purification or separation of fullerenes or nanotubes	876	....Nanotube tip
846	..Internal modifications (e.g., filling, endohedral modifications, etc.)	877	....Chemically functionalized
847	..Surface modifications (e.g., functionalization, coating, etc.)	878	....Shape/taper
848	..Tube end modifications (e.g., capping, joining, splicing, etc.)	879	....Material
849	.With scanning probe	880	.With arrangement, process, or apparatus for testing
850	..Scanning probe control process	881	..Microscopy or spectroscopy (e.g., SEM, TEM, etc.)
851	...Particular movement or positioning of scanning tip	882	.Assembling of separate components (e.g., by attaching, etc.)
852	..For detection of specific nanostructure sample or nanostructure-related property	883	..Fluidic self-assembly ("FSA")
853	...Biological sample	884	..Assembled via biorecognition entity
854	...Semiconductor sample	885	...Via nucleic acid hybridization
855	..For manufacture of nanostructure	886	...Via protein recognition
856	...Including etching/cutting	887	.Nanoimprint lithography (i.e., nanostamp)
857	...Including coating	888	.Shaping or removal of materials (e.g., etching, etc.)
858	...Including positioning/mounting nanostructure	889	..By laser ablation
859	...Including substrate treatment	890	.Deposition of materials (e.g., coating, CVD, or ALD, etc.)
860	..Scanning probe structure	891	..Vapor phase deposition
861	..Scanning tunneling probe	892	..Liquid phase deposition
862	..Near-field probe	893	..Deposition in pores (molding) with subsequent removal of mold
863	..Atomic force probe	894	.Having step or means utilizing biological growth
864	..Electrostatic force probe	895	.Having step or means utilizing chemical property
865	..Magnetic force probe	896	..Chemical synthesis (e.g., chemical bonding or breaking, etc.)
866	...Scanning capacitance probe	897	...Polymerization
867	...Scanning thermal probe	898	...Enzymatic
868	...With optical means	899	...Electrolytic
869	....Optical microscope	900	.Having step or means utilizing mechanical or thermal property (e.g., pressure, heat, etc.)
870	....Optical lever arm for reflecting light	901	.Having step or means utilizing electromagnetic property (e.g., optical, x-ray, electron beam, etc.)
		902	<b>SPECIFIED USE OF NANOSTRUCTURE</b>
		903	.For conversion, containment, or destruction of hazardous material

904	..For medical, immunological, body treatment, or diagnosis	942	...Including Protein logic element
905	..Specially adapted for travel through blood circulatory system	943	..Information storage or retrieval using nanostructure
906	..Drug delivery	944	...Biochemical memory
907	...Liposome	945	....Protein memory
908	..Mechanical repair performed/ surgical	946	....Nucleic acid memory
909	...Obstruction removal	947	...With scanning probe instrument
910	...Strengthening cell or tissue	948	..Energy storage/generating using nanostructure (e.g., fuel cell, battery, etc.)
911	...Cancer cell destruction	949	..Radiation emitter using nanostructure
912	...Cancer cell repair	950	...Electromagnetic energy
913	...Stem cell therapy implantation	951	....Laser
914	..Protein engineering	952	..Display
915	..Therapeutic or pharmaceutical composition	953	..Detector using nanostructure
916	...Gene therapy	954	...Of radiant energy
917	...Vaccine	955	...Of thermal property
918	..Immunological	956	...Of mechanical property
919	..Dental	957	...Of chemical property or presence
920	..Detection of biochemical	958	....Of biomolecule property
921	...Of toxic chemical	959	....Of disease state
922	...Of explosive material	960	...Of magnetic property
923	..Cell culture	961	.For textile or fabric treatment
924	..Using nanostructure as support of DNA analysis	962	.For carrying or transporting
925	..Bioelectrical	963	<b>MISCELLANEOUS</b>
926	..Topical chemical (e.g., cosmetic or sunscreen, etc.)		
927	..Diagnostic contrast agent		
928	...X-ray agent		
929	...Ultrasound contrast agent		
930	...MRI contrast agent		
931	..Medical device coating		
932	..For electronic or optoelectronic application		
933	..Spintronics or quantum computing		
934	...Giant magnetoresistance (GMR)		
935	...Spin dependent tunnel (SDT) junction (e.g., tunneling magnetoresistance (TMR), etc.)		
936	..In a transistor or 3-terminal device		
937	...Single electron transistor		
938	...Field Effect transistors (FETs) with nanowire- or nanotube-channel region		
939	..Electron emitter (e.g., Spindt emitter tip coated with nanoparticles, etc.)		
940	..In a logic circuit		
941	...Including DNA logic element		

