

# VT

## PATENTES

# IMPRESIÓN 3D

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Vigilancia  
Tecnológica  
3<sup>er</sup> trimestre 2021

NIPO: 116-19-050-9

Aunque en los años 80 comenzaron a desarrollarse los primeros equipos y materiales sobre la tecnología de impresión 3D también denominada fabricación aditiva, no fue hasta 1986 cuando aparece en el mercado la primera impresora 3D comercial, patentada por Charles W. Hull, premiado por la Oficina Europea de Patentes como inventor del año en 2014 en la categoría de inventores no europeos.

Cuando trataba de buscar un sistema para mejorar el proceso de realización de prototipos de pequeñas piezas de plástico que utilizaba para probar nuevos diseños de productos, desarrolló una máquina de impresión 3D que conseguía realizar en pocos minutos procesos que por aquel entonces llevaban semanas.

## Contenido



PROCESOS



MATERIALES



DISPOSITIVOS



PRODUCTOS



PROCESAMIENTO  
DE DATOS

Desde entonces, la tecnología no ha parado de evolucionar, especialmente en los últimos años, alcanzándose a partir de 2017 un verdadero auge, cuando se incorpora la automatización utilizando software de inteligencia artificial que permite industrializar la fabricación aditiva y multiplicar la capacidad de los sistemas. En estos momentos, en que la pandemia del corona virus SARS-CoV-2 azota a la población mundial, la impresión 3D se ha puesto de gran actualidad. La necesidad de fabricar de forma urgente respiradores o material de protección personal ha despertado el interés por la utilización de esta tecnología, surgiendo así multitud de iniciativas públicas y privadas.

En los últimos años de evolución de la impresión 3D hemos visto pasar del desarrollo conjunto de nuevas tecnologías y materiales innovadores aplicados principalmente a la creación de prototipos y diseños personalizados, a la consecución de productos casi impensables hace tan solo una década. Gracias a esta increíble tecnología hemos visto imprimir, órganos, coches e incluso edificios.

Desde la Oficina Española de Patentes y Marcas, y en cumplimiento de su doble objetivo de proteger y fomentar la innovación tecnológica en nuestro país, así como de divulgar la información técnica que contienen las patentes a través de sus

servicios de Información Tecnológica, se realiza este nuevo Boletín de Vigilancia Tecnológica, que se suma a los dieciséis *Boletines VT* que venimos publicando desde el año 2000 con periodicidad trimestral. Nuestro objetivo es dar a conocer las nuevas solicitudes de patentes que se publican a nivel mundial relacionadas con la tecnología de impresión 3D.

En este Boletín, se incluye una selección de las solicitudes de patentes publicadas a nivel mundial durante el tercer trimestre de 2021, distribuidas en cinco apartados: procesos, materiales, dispositivos, productos y procesamiento de datos.

Para cada patente se incluye su número de publicación, con un enlace que permite la consulta del documento completo, el solicitante, el país de origen y su título.

Esperamos que la información aportada en este Boletín de Vigilancia Tecnológica, sirva para identificar tendencias tecnológicas y sus actores, así como para contribuir a la utilización del conocimiento contenido en los documentos de patente como punto de partida para emprender nuevas actividades de investigación y desarrollo. Para suscribirse a este Boletín basta con cumplimentar este [\*formulario de suscripción\*](#).

# Procesos



Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
ES2843551	LABORATORIO DIGITAL HIGH TEETH, S.L.	Procedimiento de fabricación de prótesis dentales y prótesis dental
CN113244438	UNIV WUYI	Method for preparing three-dimensional diabetic foot ulcer functional medical dressing
WO2021173785	CARBON INC [US]	One part moisture curable resins for additive manufacturing
WO2021155933	VOLVO TRUCK CORP [SE]	Method for three-dimensional printing of a vehicle component
US11069153	FITZ FRAMES INC [US]	Apparatus and method for creating bespoke eyewear
WO2021136716	SIGNIFY HOLDING BV [NL]	Optical effects of 3D printed items
US2021177093	ADIDAS AG [DE]	Footwear midsole with warped lattice structure and method of making the same
EP3851268	HEWLETT PACKARD DEVELOPMENT CO [US]	Identification of 3D printed objects
US2021207281	CALIFORNIA INST OF TECHN [US]	Method for embedding inserts, fasteners and features into metal core truss panels
KR102300954	CHOI S H	A forming method for internal metal mold
CN113290849	WANG X	Additive manufacturing method for powder spreading printing and forming
EP3871859	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing
CN113183452	CHINESE ACAD SCI TECHNOLOGY & ENG CENT [CN]	Multi-material complex structure 4D printing method and product with variable mechanical properties
US2021229364	UNIV COLORADO REGENTS [US]	Stereolithography with micron scale control of properties
WO2021158636	CABOT CORP [US]	Composition for liquid-based additive manufacturing
KR102286444	KYUNGPOOK NAT UNIV IND ACADEMIC COOP FOUND [KR]	3D printing method soft sensor manufactured therefrom and use thereof
KR102280303	SIGHTGLASS CO LTD [KR]; MA JOON OH [KR]	3D Method for glasses frame manufacturing having a color change function using 3D printer
CN113021878	UNIV SHAOYANG	Direct writing printing method of Nafion hollow tube structure
CN113163697	UNIV CHANGZHOU	Method for preparing broadband electromagnetic wave absorbing metamaterials based on 3D printing

Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
EP3854570	ADDITIVE ELEMENTS GMBH [DE]	Method for producing a three-dimensional moulded part
CN112917892	SUZHOU YONGQINQUAN INTELLIGENT EQUIPMENT CO LTD	Biological 3D printing method based on nutrition runner
WO2021175780	SIGNIFY HOLDING BV [NL]	3D item with interpenetrating layers produced by multi-material printing
CN113246468	UNIV WUYI	Preparation method of bioactive medical dressing
WO2021183133	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing
WO2021176217	ADDITIVE MANUFACTURING TECH LTD [GB]	Method for post-processing an additively manufactured part
US2021237343	XEROX CORP [US]	Method and system for 3D printing on fabric
CN113119445	GUANGZHOU MEDPRIN REGENERATIVE MEDICINE	A biological 3D printing method and biological 3D printing equipment with conformal refrigeration function
KR102273407	GRAPHY INC [KR]	3D Post-curing method of 3D printer output and transparent orthodontic device manufactured by the method
CN112917899	SUZHOU YONGQINQUAN INTELLIGENT EQUIPMENT CO LTD	Biological 3D printing method based on porous structure
CN112873852	UNIV LONGDONG	Makeup method based on 3D printing technology
WO2021118555	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing
CN112895424	UNIV CENTRAL SOUTH	Three-dimensional negative Poisson's ratio structure, additive manufacturing method, 3D printer and application
CN112895423	SHANDONG FENGZEYUAN LEATHER CO LTD	Method for drawing surface of cow leather
CN113210626	UNIV JIANGSU; JIANGSU HAIYU MACHINERY CO LTD	Method for 4D printing functionally graded titanium-nickel shape memory alloy components
WO2021148624	THALES SA [FR]; CENTRE NAT ETD SPATIALES [FR]; UNIV TOULOUSE 3 PAUL SABATIER [FR]; CENTRE NAT RECH SCIENT [FR]	Method for manufacturing a multi-material part by additive manufacturing, using the technique of powder bed selective laser melting or selective laser sintering

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Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
ES2858483	ASOCIACION DE LA INDUSTRIA NAVARRA (AIN)	Composición termoplástica basada en zeína para manufactura aditiva.
CN113321907	ZHANG X	Composite 3D printing material containing coffee grounds and preparation method and application thereof
WO2021162007	KURARAY NORITAKE DENTAL INC [JP]	Resin composition for stereolithography
CN112843337	UNIV JINAN	Silk bionic bio-ink as well as preparation method and application thereof
CN112843332	EAST CHINA INST OF DIGITAL MEDICAL ENGINEERING	Bone repair material as well as preparation method and application thereof
US2021179759	TRIAD NAT SECURITY LLC [US]	Hierarchical printed product and composition and method for making the same
EP3872202	MITSUBISHI POWER LTD [JP]	Cobalt-based alloy product
EP3838592	EVONIK OPERATIONS GMBH [DE]	Composition comprising polyesters for additive manufacturing
WO2021117836	CANON KK [JP]	Photocurable material composition, and cured product of photocurable material composition and method for manufacturing same
US2021206961	EOS OF NORTH AMERICA INC [US]	Biodegradable material for additive manufacture
WO2021133585	CARBON INC [US]	Inhibition of crystallization in polyurethane resins
WO2021182509	MAXELL HOLDINGS LTD [JP]	Clear modeling material composition, modeling material composition set, and composition set for stereolithography
WO2021177503	L&C BIO CO LTD [KR]	Composition using cartilage component-based bio-ink to construct structure for purpose of microtia treatment, and preparation method therefor
CN113183455	SUZHOU JUFU POLYMER MATERIALS CO LTD	Foam wire and preparation method
JP2021126854	AIR WATER INC, DENKEN-HIGHDENTAL CO LTD	Dental photocurable composition
US2021230439	3D SYSTEMS INC	Build materials for 3D printing comprising polar and non-polar wax components.
FR3107060	ARKEMA FRANCE [FR]	Polyamide powder and method of preparation thereof

Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
US2021189605	U S ARMY RES LABORATORY ATTN RDRL LOC I [US]	Multi-material polymer filament for three-dimensional printing co-drawn with functional or structural thread
EP3858515	INST JOZEF STEFAN [SI]	Filament with oriented magnetic particles for 3D printing of anisotropic magnets
EP3848184	BOEING CO [US]	Coated sheets for improved additive manufacturing parts
WO2021142402	PROMERUS LLC [US]	Stable mass polymerizable polycycloolefin compositions as 3D printing materials and a method of fabrication thereof
CN11294048	FUJIAN HUAFENG NEW MAT CO LTD	Novel additive printing material and application thereof in ceramic 3D printing equipment
US2021189157	YAMAGUCHI TATSUKI [JP]; NOGUCHI SOH [JP]; MORITA MITSUNOBU [JP]; OKADA TAKASHI [JP]	Active energy ray curable composition, active energy ray curable ink composition, active energy ray curable inkjet ink composition, composition container, image forming device, image forming method, cured matter, and decorated matter
WO2021141592	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing with ph indicator compounds
WO2021141593	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing with annealed polyether polyamide copolymer particles
WO2021131994	DAINIPPON INK & CHEMICALS [JP]	Three-dimensional modeling pattern material, cured product, cubic molded article, and method for producing mold by using said cubic molded article
FR3105791	ARKEMA FRANCE [FR]	Crosslinkable composition comprising a mono (meth) acrylate having a 1,3-dioxolane ring
WO2021118529	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing with scent agents
JP2021095567	CANON KK	Photocurable material composition, cured product of photocurable material composition and manufacturing method thereof

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# Dispositivos



Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
ES2853373	BARCELONA THREE DIMENSIONAL PRINTERS [ES]	Máquina para fabricación aditiva y métodos de fabricación aditiva relacionado
US2018345584	3D SYSTEMS INC [US]	Three dimensional printing system with improved reliability, safety, and quality
DE102020001398	AM SIS GMBH [DE]	Method for additively manufacturing a three-dimensional component, and repairing system
WO2021108935	UNIV TECNICA FEDERICO SANTA MARIA UTFSM [CL]	Moveable robotised cell for the production of pieces with a frame or vertical ducts pre-installed inside same and of enclosures, printed on site by means of a multi-axis 3D printing system, and operating method
WO2021158659	ADVANCED SOLUTIONS LIFE SCIENCES LLC [US]	Modular light source for curing of 3D printed biological and engineered materials
US2018264732	IMPOSSIBLE OBJECTS INC [US]	Method and apparatus for powder system recycler for printing process
US2021221066	CONCEPT LASER GMBH [DE]	Gas conditioning by additional gas management and monitoring tool
DE102020001068	DP POLAR GMBH [DE]	Method of producing a molded three-dimensional object by means of a layer-by-layer material application
WO2021154237	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing with flame retardants
KR102281427	DENTIS CO LTD [KR]	3D build plate for 3D printer
WO2021154247	HEWLETT PACKARD DEVELOPMENT CO [US]	Filter Cleaning
WO2021175737	ALD VACUUM TECHN GMBH [DE]	Doctor blade unit for an additive manufacturing system having a pulverous starting material
FR3105038	ADDUP [FR]	Removable additive manufacturing module
WO2021099459	NORSK TITANIUM AS [NO]	Distortion mitigation in directed energy deposition
WO2021173108	HEWLETT PACKARD DEVELOPMENT CO [US]	Build platforms with a flexible element
WO2021160999	FABRX LTD [GB]	Apparatus and method for 3D printing
WO2021154202	HEWLETT PACKARD DEVELOPMENT CO [US]	Spreader supports comprising elevated wings
JP6896193	MITSUBISHI ELECTRIC CORP [JP]	Lamination-modeling apparatus for forming molded article by adding work-material to workpiece
WO2021154221	HEWLETT PACKARD DEVELOPMENT CO [US]	3D printing cleaning modules
WO2021170448	EOS GMBH ELECTRO OPTICAL SYSTEMS [DE]	Method and device for determining a distance in an additive manufacturing device
GB2589933	XAAR 3D LTD [GB]	Infrared lamp assembly for apparatus for the layer-by-layer formation of three-dimensional objects



Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
EP3877155	BRINTER OY [FI]	Modular systems and methods for performing additive manufacturing of objects
WO2021166005	AXTRA3D INC [US] ZITELLI GIANNI [IT]	Method and apparatus for isotropic stereolithographic 3D printing with a variable speed and power hybrid light source
WO2021166006	AXTRA3D INC [US] ZITELLI GIANNI [IT]	3D printing apparatus of the bottom-up photocuring type with variable refraction index rotary glass and relative method of use
WO2021163379	UNIV ARKANSAS [US]	Swarm manufacturing for smart factory
WO2021162541	ULTIMAKER B V [NL]	Filament feeder
KR20210089042	DE&T CO LTD [KR]	3D apparatus and method for controlling the nozzle unit of a 3Dprinter
WO2021154262	HEWLETT PACKARD DEVELOPMENT CO [US]	Non-powered platforms
EP3858582	TNO [NL]	A print head module and printer
TW202126472	YOUNG OPTICS INC [TW]	Three dimensional printing apparatus and manufacturing method thereof
WO2021149418	RICOH CO LTD [JP] FUJII TOSHISHIGE [JP]	Shaping device, shaping method, composite, production method of composite, wig base, wig, and production method of wig
EP3513948	REVOTEK CO LTD [CN]	Device for printing lumen tissue construct, method for using the same and 3D bioprinter
JP2021104581	RICOH KK [JP] ASPECT KK [JP]	Apparatus for manufacturing three-dimensional molded item
EP3842864	CUBICURE GMBH [AT]	Systems and methods for lithography-based additive manufacturing three-dimensional (3D) structures
GB2589934	XAAR 3D LTD [GB]	Infrared radiation deflector for apparatus for the layer-by-layer formation of three-dimensional objects
JP2021094781	MITSUBISHI HEAVY IND LTD	Supporting device for three-dimensional modeling and method for manufacturing three-dimensional object

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# Productos



Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
WO2021177029	NIPPON LIGHT METAL CO [JP]	Shaped article
CN113288524	UNIV PEKING THIRD HOSPITAL	Lateral meniscus transplant substitute with bone bridge-like fixing structure and manufacturing method
CN214017780	GUANGXI HUISITONG TECHNOLOGY CO LTD	3D printing-based mandibular fixation guide plate
CN113199743	BEIJING MILU ECOLOGICAL REASERCH CENT	3D printed specimens of endangered animals
CN113017944	GUANGDONG PROVINCIAL PEOPLES HOSPITAL GUANGDONG ACAD OF MEDICAL SCIENCES; EAST CHINA INST OF DIGITAL MEDICAL ENGINEERING	Artificial blood vessel stent with biological activity as well as preparation method and application of artificial blood vessel stent
CN113081985	UNIV TIANJIN TRADITIONAL CHINESE MEDICIN	3D printing ginkgo ketone ester tablet and preparation method thereof
CN112940361	JIANGSU SHIPPING COLLEGE	Intelligent latex pillow based on 3D printing and customization method thereof
CN112970808	UNIV SOUTH CHINA TECH	Nutritional and healthy germinated highland barley biscuits based on 3D printing technology and making method thereof
US2021168543	STATON TECHIYA LLC [US]	Device and method to reduce ear wax clogging of acoustic ports, hearing aid sealing system, and feedback reduction system
WO2021116895	NICOVENTURES TRADING LTD [GB]; JOHNSON SAVANNAH [US]	Stimulus-responsive pouch
US2021206983	SAUDI ARABIAN OIL CO [SA]	Reversible aminal gel compositions, methods, and use in three-dimensional printing
JP2021133448	RICOH KK	Suction type holding member
KR20210083140	KYUNGPOOK NAT UNIV IND ACADEMIC COOP FOUND [KR]	Dry attachable pad
CN113232294	UNIV SHAANXI SCI & TECHNOLOGY	A bidirectional deformation structure based on 4d printing
CN113021877	UNIV HANGZHOU DIANZI	Preparation method for 3D printing patterned ion exchange membrane
US2021218039	CHEN RONG JIE [TW]; LIN CHIH HUNG [US]	Box-in-box structure comprising thermal clay, use of the same and method to form the same
CN112891022	GUANGDONG SECOND PROVINCIAL GENERAL HOSPITAL GUANGDONG PROVINCIAL EMERGENCY HOSPITAL	Ocular prosthesis and manufacturing method thereof
CN113103566	UNIV ZHEJIANG	3D printing shrinkable article adapter

Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
CN113303560	ZHEJIANG RED DRAGONFLY SHOES JOINT CO LT	3D printing sole
CN113288525	UNIV PEKING THIRD HOSPITAL	Medial meniscus transplant substitute with tenon- and-mortise fixing structure and manufacturing method
CN113246460	FUJIAN HUAFENG SPORTS SCI & TECHNOLOGY	A 3D additive cilia structure and its preparation method and application

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# Procesamiento de Datos



Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
WO2021127201	PENN STATE RES FOUND [US]	Determining build orientation to minimize thermal distortion
US2021146631	UNIV CALIFORNIA [US]	Method for automated quality monitoring and control of cementitious/concrete 3D printing/additive manufacturing
US2021138735	NANOTRONICS IMAGING INC [US]	Systems, methods, and media for manufacturing processes
US2021240159	INTACT SOLUTIONS INC [US]	Moment-based representation for interoperable analysis
JP2021135725	CANON KK [JP]	Image Processing Apparatus of Image Processin System
WO2021167604	HEWLETT PACKARD DEVELOPMENT CO [US]	Display rendering of nonlinearly scaled 3D parts
WO2021156292	BELLASENO GMBH [DE]	Arrangements for forming three-dimensional structures, and related methods thereof
WO2021154244	HEWLETT PACKARD DEVELOPMENT CO [US]	Generation of an object model for three dimensional printers
WO2021150215	HEWLETT PACKARD DEVELOPMENT CO [US]	Geometrical compensation models
KR102274892	METAMORP LTD [KR]	Method and system for generating slice data of 3D printer based on cloud computing
US2021229365	IMPOSSIBLE OBJECTS INC [US] IMPOSSIBLE OBJECTS LLC [US]	Camera-based monitoring system for 3-dimensional printing
EP3851268	HEWLETT PACKARD DEVELOPMENT CO [US]	Identification of 3D printed objects
US2021216683	UNIV NEW YORK STATE RES FOUND [US]	Periodic cellular structure based design for additive manufacturing approach for light weighting and optimizing strong functional parts
KR2021006665	LEE JUNG HYUN [KR]	3D stereoscopic map output device using 3D lidar system and 3D printer
WO2021108228	NEXA3D INC [US]	Methods and systems for determining viscosity of photo-curing resin for vat photopolymerization printer
KR20210106973	WHOBORN INC [KR]	Output system for using 3 dimensional printer and the method
US2021279375	FUJIFILM BUSINESS INNOVATION CORP [JP]	Information processing device, three-dimensional shape data generation device, three-dimensional shaping device, and non-transitory computer readable medium

Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
<a href="#">US2021221030</a>	US GOV VETERANS AFFAIRS [US]; UNIV PENNSYLVANIA [US]	Anatomic tissue-engineered osteochondral implant and method for fabrication thereof
<a href="#">JP2021120187</a>	SODIC CO LTD [JP]	Lamination-modeling apparatus for manufacturing three-dimensional molded article that determines abnormality occurred when inclination of linear function
<a href="#">US11072125</a>	INKBIT LLC [US]	Reflective coating for material calibration
<a href="#">KR102289167</a>	KOREA INST IND TECH [KR]	Head module assembly of 3D printer and 3D printer and 3D printing method including same
<a href="#">US2018257305</a>	GENERAL ATOMICS AERONAUTICAL SYSTEMS INC [US]	Systems and methods for tool-less manufacturing of thermoplastic parts (B2) systems and methods for tool-less manufacturing of thermoplastic parts
<a href="#">WO2021118535</a>	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional (3D) printed objects with fracture channels



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