

# VT

## PATENTES

# IMPRESIÓN 3D

# 10



OBJETIVOS  
DE DESARROLLO  
SOSTENIBLE



Vigilancia  
Tecnológica  
2º trimestre 2022

NIPO: 116-19-050-9

En este Boletín de Vigilancia Tecnológica se recogen, de manera trimestral, los avances acontecidos en el campo de la tecnología de Impresión 3D que se materializa en forma de solicitudes de patente en todo el mundo.

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 testar 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 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 segundo trimestre de 2022, 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 PAÍS DE ORIGEN	CONTENIDO TÉCNICO
US2022152924	UNIV HONG KONG CHINESE [CN]; UNIV CARNEGIE MELLON [US]	3D nanofabrication based on hydrogel scaffolds
CN114379092	IROCK TECHNOLOGIES CO LTD	Artificial core preparation method
CN114131921	XIANGSAN TRAFFIC UNIV	Curved surface conformal 4D printing method of thin-wall heterostructure and heterostructure
CN114160808	HANGZHOU FORWARD ADDITIVE MANUFACTURING TECH LIMITED COMPANY	Three-dimensional forming method and 3D printing device
WO2022113607	RICOH CO LTD [JP]; SUHARA HIROYUKI [JP]; AOTO JUN [JP]	Flying body generating method and flying body generating apparatus, image forming apparatus, and three-dimensional object producing apparatus
US11345081	THERMWOOD CORP [US]	Method of producing patterns, molds, and related products
EP4000864	VITO NV [BE]	A method and system for controlling an extrusion system for additive manufacturing
CN114274500	UNIV XIAN JIAOTONG	3D printing method of vibration isolation shoe midsole based on absolute zero stiffness structure
CN114103095	AEROSPACE SPECIAL MATERIAL AND TECH RESEARCH INSTITUTE	Lightweight aircraft based on lattice structure material and manufacturing method thereof
WO2022101174	SIGNIFY HOLDING BV [NL]	Fff manufactured light reflective surfaces
EP3984721	IVOCLAR VIVADENT AG [LI]	Method for controlling the process of a stereolithography-3D process
US2022111579	APPLIED MATERIALS INC [US]	Hybrid printing platform for 3D bioprinting of live organs
WO2022093260	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing
WO2022093190	HEWLETT PACKARD DEVELOPMENT CO [US]	3D printing with build material layer contone maps
EP3984722	XEROX CORP [US]	Thermoplastic particulates comprising a carboxylic acid-based sintering aid and additive manufacturing therewith
WO2022084921	BMF MATERIAL TECH INC [CN]	A multi-scale system for projection micro stereolithography
CN113694891	UNIV HUAQIAO	Method for preparing carbon black adsorption material based on 3D printing
WO2022081140	HEWLETT PACKARD DEVELOPMENT CO [US]	3D objects with layers of solidified and void portions
DE102020125278	BUNDESREPUBLIK DEUTSCHLAND VERTRETEN DURCH DAS BUNDESMINISTERIUM FUER WIRTSCH UND ENERGIE DIESES VER [DE]	3D printing method with a curable liquid containing ferromagnetic nanoparticles
DE102020124546	AUDI AG [DE]; VOLKSWAGEN AG [DE]	3D printing method for producing a 3D component using the CLIP method

Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
CN114013030	UNIV DALIAN TECH	Manufacturing method of large-scale silica gel blood vessel model based on rotating-spraying-temperature control mechanism
WO2022028860	SIGNIFY HOLDING BV [NL]	Method and 3D printing apparatus for production of a luminaire, and a luminaire
CH718075	KIF PARECHOC SA [CH]	A process for manufacturing a metal part, a part obtained by this process and a horological article comprising such a part
WO2022123177	SAFRAN [FR]	High-pressure turbine blade comprising a cavity under a squealer tip
CN114309663A;	XEROX CORP	Metal droplet jet 3D method
CN114226753	SCIENCE AND TECHNOLOGY UNIV IN CHINA	Boron nitride in-situ composite reinforced metal additive integrated manufacturing method
CN114226759	SEASON HUA LABORATORY	Laser device for SLM metal 3D printing and printing method
CN113579227	CHONGQING RESEARCH INSTITUTE OF JILIN UNIV	Preparation method of porous artificial bone with adjustable degradation rate based on slurry direct writing
US2022105673	XEROX CORP [US]	Micro-welding using a three-dimensional printer
WO2022119583	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing
EP3995289	FIAT RICERCHE [IT]	Method of producing a motor-vehicle dashboard
EP3974903	UNIV WIEN MED [AT]	Method for producing a light-curable resin composition
WO2022118717	MITSUI CHEMICALS INC [JP]	Shaped article manufacturing method and shaped article
US2022125553	LEMCHEN MARC [US]	Methods for Direct Printing of Orthodontic and Dental Appliances onto the Teeth of a Patient

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Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
ES2915589	UNIVERSIDAD DE CÁDIZ [ES]	Material compuesto para uso en estereolitografía y procedimiento de obtención
US11285242	UNIV NORTH CAROLINA CHARLOTTE [US]	Processing and bioactivation of a novel sic medical device
EP4008457	AIRBUS DEFENCE & SPACE GMBH [DE]	Aluminium alloy and process for additive manufacture of lightweight components
US2022126402	STARCK H C INC [US]	Fabrication of high-entropy alloy wire and multi-principal element alloy wire
CN114226734	UNIV BEIJING IND & COMMERCE	Copper-containing wear-resistant coating on surface of additive manufacturing titanium alloy and preparation process of copper-containing wear-resistant coating
CN114012101	SHANXI INST OF INDUSTRY LTD	Preparation method of high-strength and high-toughness stainless steel powder for selective laser melting additive manufacturing
CN114010842	WENZHOU INST UCAS INST OF BIOMATERIALS AND ENGINEERING	Microfluidic 3D-printed bionic skin scaffold based on polyhydroxyalkanoate and preparation method thereof
CN113845848	UNIV GUILIN TECHNOLOGY	Waste cooking oil-based high-flexibility pressure-sensitive adhesive type 4D printing material and synthesis method thereof
WO2022113863	CANON KK [JP]	Photocurable resin composition, cured object obtained therefrom, and method for producing three-dimensional object
JP2022079184	TORAY IND INC [JP]	Polyamide resin powder or granular material
JP2022064678	NAGASE CHEMTEX CORP	Laminate molded product of photostetting resin for 3D printing
TWI749811	UNIV NAT CHUNG CHENG [TW]	Laminated printing soft material containing plant fibers
JP2022054818	DKS CO LTD	Gelling agent composition for 3D printing
EP3991946	XEROX CORP [US]	Thermoplastic particulates coated with polymer nanoparticles and methods for production and use thereof
EP3978246	UNIV BRETAGNE SUD [FR]; CAPNOVIA [FR]	Use of a composition including a high rate of inorganic material(s) and a thermoplastic elastomer in an additive manufacturing method
WO2022080316	CANON KK [JP]	Photocurable resin composition for three-dimensional shaping, and method for manufacturing three-dimensional object

Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
US2022056215	RIOS ORLANDO [US]; CARTER WILLIAM G [US]; KESSLER MICHAEL R [US]; LI YUZHAN [US]; GOSWAMI MONOJOY [US]; UT BATTELLE LLC; NORTH DAKOTA STATE UNIV	Composition for thiol-ene-based polymerization and liquid crystalline network-containing objects formed therefrom using additive manufacturing
WO2022060344	HEWLETT PACKARD DEVELOPMENT CO [US]	Particulate build materials for three-dimensional printing
WO2022106402	BASF SE [DE]; FAN WEI ZHENG [CN]	Flame-retardant pulverulent composition and 3D-printed object obtained from the same
WO2022074120	IGM RESINS ITALIA SRL [IT]	Ketoquinolones as photoinitiators
CN114226708	CONSTANT ADDITION ADDITIVE MANUFACTURING RES CENTER FOSHAN LIMITED COMPANY	Steel powder for 3D printing and preparation method thereof

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# Dispositivos



Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
WO2022081262	APPLIED MATERIALS INC [US]	Hybrid printing platform for 3D bioprinting of live organs
WO2022086485	HEWLETT PACKARD DEVELOPMENT CO [US]	Cleaning 3D printed objects through porous media
EP3995292	GEN ELECTRIC [US]	Cleaning systems for additive manufacturing apparatuses and methods for using the same
WO2022090451	FUND EURECAT [ES]	3D printing device, 3D printing method and 3d tubular objects obtained by said method
WO2022086503	HEWLETT PACKARD DEVELOPMENT CO [US]	Printing with multiple carriages
EP3991884	GEN ELECTRIC [US]	Rake arm assemblies
ES2915404	UNIV LAGUNA [ES]	Émbolo medidor de presión para plataformas de impresión 3D en extrusión de masas semisólidas
WO2022076235	CARBON INC [US]	Vapor spin cleaning of additively manufactured parts
WO2022115104	HEWLETT PACKARD DEVELOPMENT CO [US]	Treating three-dimensional printed objects with liquid oil
WO2022098231	ULTIMAKER B V [NL]	Dual filament feeder assembly for an additive manufacturing system
DE202021003596	DIHESYS DIGITAL HEALTH SYSTEMS GMBH [DE]	Printing device for additive manufacturing of object pharmaceutical dosage form
WO2022072359	MANTLE INC [US]	Waste collection and abatement during hybrid additive and subtractive manufacturing
US2022134440	EDISON WELDING INST INC [US]	Multi-beam coaxial laser optical system for use in additive manufacturing
WO2022115197	SEURAT TECH INC [US]	Light valve cooling system
WO2022090663	SAFRAN LANDING SYSTEMS [FR]	Means for receiving powder in an additive manufacturing machine
WO2022072305	3D SYSTEMS INC [US]	Three-dimensional print engine with large area build plane having optimized gas flow director structures
WO2022090321	REGENHU AG [CH]	Temperature-regulated additive manufacturing
WO2022096670	TRUMPF LASER & SYSTEMTECHNIK GMBH [DE]	Suction device for extracting process gas from a process chamber of an apparatus, and apparatus for manufacturing three-dimensional objects
JP7018532	SODICK CO LTD [JP]	Electrostatic precipitator for lamination-modeling apparatus
WO2022071956	HEWLETT PACKARD DEVELOPMENT CO [US]	Dispensing print agent from print bars

Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
FR3114536	ECOLE NAT SUPERIEURE DARTS ET METIERS ENSAM [FR]; SAFRAN [FR]; CENTRE NAT RECH SCIENT [FR]; CONSERVATOIRE NAT DES ARTS ET METIERS [FR]	Winding of filament for additive manufacturing device
US2022099297	GEN ELECTRIC [US]	Fuel injector for a turbomachine
WO2022124982	UNIV NANYANG TECH [SG]; CES_SDC PTE LTD [SG]	Apparatus and method for concrete additive manufacturing
US2022152928	NEXA3D INC [US]	Oled light source and multi-material membrane for vat polymerization printer
WO2022118202	MARK ONE S R L [IT]	An extruding device for making three-dimensional objects
JP2022065881	EBARA CORP [JP]	AM system for manufacturing modeled object with specific gate is provided to open and close outlet of buffer chamber
DE102020214692	BOSCH GMBH ROBERT [DE]	Decive for additive manufacturing with inlet device with two inlet openings connected to construction chamber
WO2021090089	IO TECH GROUP LTD [GB]	Systems for material deposition
WO2022087044	GEN ELECTRIC [US]	Material supply system and method for using the same
WO2022086564	HEWLETT PACKARD DEVELOPMENT CO [US]	Scoop and dispense for additive manufacturing
WO2022075013	EBARA CORP [JP]	Powder supply device, and am device using powder supply device
US2022063193	NEXA3D INC [US]	Multi-material membrane for vat polymerization printer
WO2022038552	KING ADBULLAH UNIV OF SCIENCE AND TECHNOLOGY [SA]	Nozzle for 3D bioprinting
US11345081	THERMWOOD CORP [US]	Method of producing patterns, molds, and related products
JP2022076959	DAIHATSU MOTOR CO LTD [JP]	3D printer with control unit to control resin material discharge with control of density of resin material
KR20220064333	KIM BYUNG KAG [KR]; AN MI SEON [KR]	3D splitter for 3D printer
WO2022093262	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing

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# Productos



Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
ES2912698	GÓMEZ BAÑO, Félix [ES]	Estructura multifásica, método de fabricación de la misma y prótesis dental.
ES2907514	Universidad Politécnica de Madrid [ES]	Celda unidad de metamaterial y metamaterial formado a partir de dicha celda unidad
US2022072618	SWAGELOK CO [US]	Low-temperature case hardening of additive manufactured articles and materials and targeted application of surface modification
EP3985277	ARIANEGROUP SAS [FR]	Improved damping device for spacecraft and method for manufacturing the damping device
US2022134639	VADIENT OPTICS LLC [US]	Additive manufacture using composite material arranged within a mechanically robust matrix
US2022064463	L LIVERMORE NAT SECURITY LLC [US]	Three dimensional porous siloxanes using leachable porogen particles
WO2022029211	SIGNIFY HOLDING BV [NL]	Continuous hollow tube printing using fdm
CN114504463	KOCEL INTELLIGENT EQUIP CO LTD	Urn formed by 3D printing process
CN114433874	CAPITAL AEROSPACE MACHINERY CO	Leaf-like tissue porous radiator
US11362620	BACHMAN ERIC C [US]	Large scale production of photovoltaic cells and resulting power
WO2022106998	3M INNOVATIVE PROPERTIES CO [US]	Articles, methods and compositions comprising polymerizable dicarbonyl polymers
CN114451953	NATON BIOTECHNOLOGY BEIJING CO LTD [CN]	Knee joint personalized positioning osteotomy device
US2022133624	UNIV AJOU IND ACADEMIC COOP FOUND [KR]	Method for producing oral disintegrating film comprising poorly soluble drug
CN114272441	UNIV FOSHAN	Osteochondral scaffold
CN113854763	SHENZHEN HUIQING TECH CO LTD	3D printed public chair and manufacturing method thereof
EP3995290	SIKA TECH AG [CH]	Method for customized production of roofing detail parts
CN114081998	CHANGZHOU NO 2 PEOPLES HOSPITAL	Skin scaffold and preparation method thereof
CN114028622	TIANJIN STOMATOLOGICAL HOSPITAL PLASTIC SURGERY HOSPITAL OF TIANJIN HOSPITAL OF STOMATOLOGY NANKAI U; THE INST OF SEAWATER DESALINATION AND MULTIPURPOSE UTILIZATION MNR TIANJIN	Preparation method of bone repair material containing antibacterial peptide
WO2022064377	QTOOL S R L [IT]	A mould for injection moulding made by additive manufacturing
US2022089015	GM GLOBAL TECH OPERATIONS LLC [US]	Additive manufactured grille and method

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# Procesamiento de Datos



Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
WO2022111973	SIEMENS AG [DE]	Method for producing an object layer by layer
US2022172645	UNIV LOUISIANA STATE [US]	Three-dimensional tactile map system
WO2022131461	ROKIT HEALTHCARE INC [KR]	Method for automatically recognizing boundary of affected area on basis of artificial intelligence, and method for creating three-dimensional affected area model
WO2022047471	BAKER HUGHES OILFIELD OPERATIONS LLC [US]	Artificial intelligence in additive manufacturing and related systems, methods, and devices
WO2022071927	HEWLETT PACKARD DEVELOPMENT CO [US]; INST ATLANTICO [BR]	3D printer part packing
US2022171902A1;	INKBIT LLC [US]	Machine learning for additive manufacturing
JP2022078804	MITSUBISHI ELECTRIC CORP [JP]	Additive manufacturing device with control unit that controls supply state of additive material based on positional relationship between tip portion nozzle and processing surface
WO2020214965	ORIGIN LABORATORIES INC [US]	Method for regulating temperature at a resin interface in an additive manufacturing process
WO2022070467	BROTHER IND LTD [JP]	Data generating program and three-dimensional fabrication system
US2020265122	AUTODESK INC [US]	3D geometry generation for computer aided design considering subtractive manufacturing forces
US11328809	OXILIO LTD [CY]	Systems and methods for manufacturing an orthodontic appliance
WO2022106608	VITO NV [BE]	A method and system for controlling an extrusion system for additive manufacturing
WO2019070905	JABIL INC [US]	Apparatus, system and method of process monitoring and control in an additive manufacturing environment
US2022108520	ABLE HANDS REHAB PC [US]	Method for generating a custom hand brace for a patient
WO2022066769	JABIL INC [US]	Apparatus, system, and method for blockchain tracking of spooled additive manufacturing print material
WO2015171312	NIKE INNOVATE CV [US]; STERMAN YOAV [US]; WAATTI TODD A [US]	System and method for forming three-dimensional structures with different material portions
WO2022093276	HEWLETT PACKARD DEVELOPMENT CO [US]	Flexibility of features of an object to be additively manufactured
KR102380280	RNX INC [KR]	3D real-time defect detection device for output in 3D printing process of selective laser sintering

Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
<a href="#">WO2022064942</a>	KOBE STEEL LTD [JP]	Modeling condition setting method, laminated modeling method, laminated modeling system, and program
<a href="#">WO2021026102</a>	ORIGIN LABORATORIES INC [US]	Method and system for interlayer feedback control and failure detection in an additive manufacturing process
<a href="#">WO2022028860</a>	SIGNIFY HOLDING BV [NL]	Method and 3D printing apparatus for production of a luminaire, and a luminaire



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