
COPPER 3D

COPPER 3D

Dispositivos Médicos

que **previenen infecciones**

y aceleran la recuperación **clínica**

PROBLEMA



Infecciones por dispositivos médicos, una crisis con hasta **50% de mortalidad** en pacientes críticos, graves secuelas y **costos** asociados de US$ 5,3 billones

Mateo (10) requiere cirugía de codo con instrumental específico y materiales activos para prevenir infecciones, las que suelen retrasar dramáticamente las recuperaciones.

PROBLEMA

Elevar la **bioseguridad** es **urgente**, **AHORA**

La resistencia antimicrobiana es
una **amenaza global;** millones de vidas
y la sostenibilidad de la medicina moderna
están en **riesgo** hacia 2050.

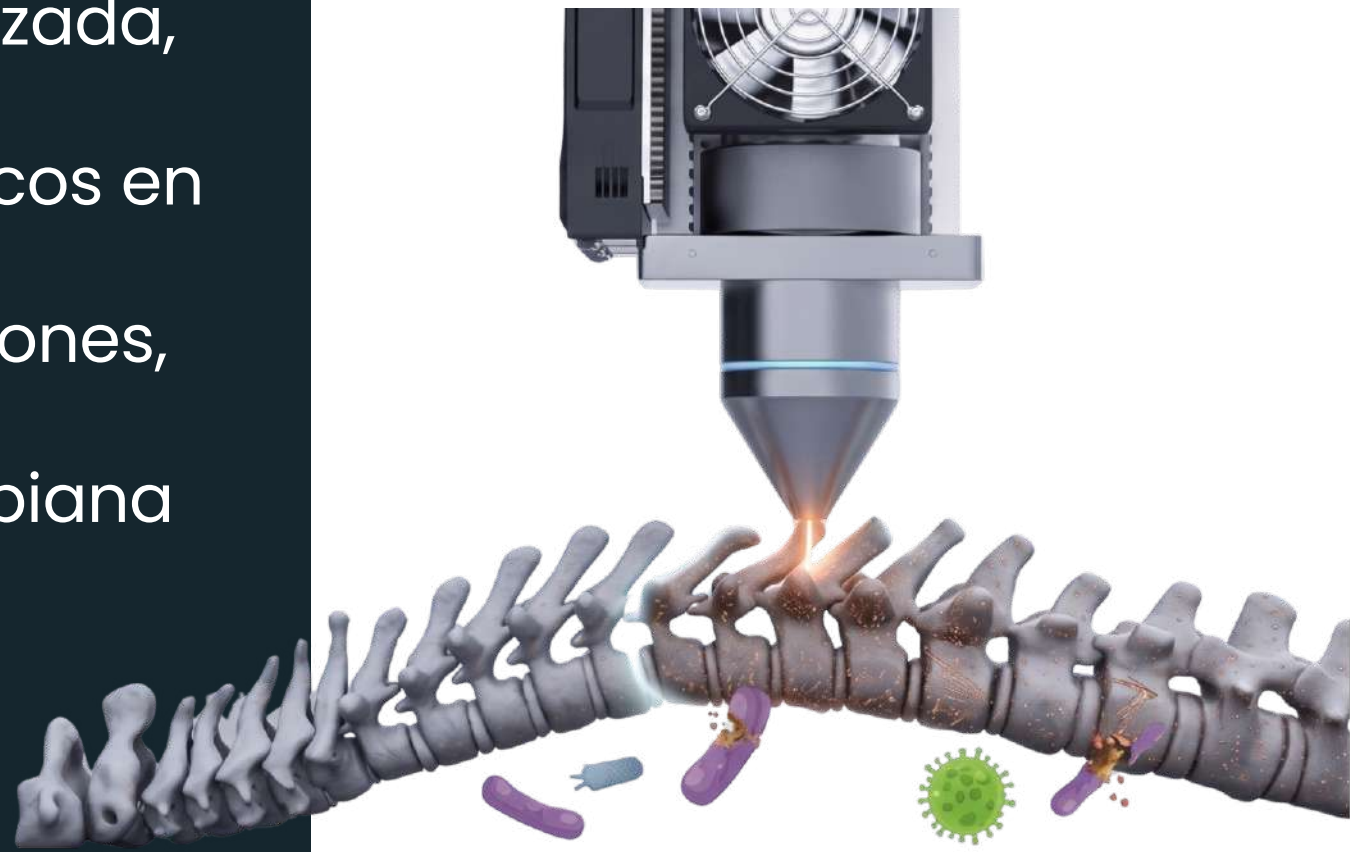


WORLD ECONOMIC FORUM

Fuente:
https://www.weforum.org/stories/2026/01/why-act-now-antimicrobial-resistance/

Creamos una Tecnología Activa

En la Era de la Medicina Personalizada, transformamos dispositivos médicos en soluciones activas contra infecciones, integrando tecnología antimicrobiana e impresión 3D.



MODELO DE MERCADO · MANUFACTURA ADITIVA BIOMÉDICA

TAM · SAM · SOM

COPPER 3D

CAGR GLOBAL 2024–2030

18% – 22%



Valores estimativos basados en proyecciones de mercado global. El modelo TAM, SAM, SOM es conceptual.

DESGLOSE DEL TAM GLOBAL

- Materiales para implantes (titanio, PEEK)
- Resinas dentales y de modelo
- Polímeros de grado médico
- Bio-tintas para bioimpresión
- Materiales de soporte

ENFOQUE DEL SAM BIOMÉDICO

SEGMENTACIÓN POR REGIÓN

- Norteamérica (~25%)
- Europa (~28%)
- Asia-Pacífico (~25%)
- Resto del mundo

APLICACIONES

- Comercialización de materiales
- Desarrollo de dispositivos médicos

MERCADO OBJETIVO — REGULACIÓN Y GEOGRAFÍA

- Requerimientos de biocompatibilidad
- Lanzamientos en EE.UU. y Europa
- Partners de comercialización regionales

TENDENCIAS CLAVE DE CRECIMIENTO

- Medicina de precisión
- Avances en materiales
- Evolución en regulaciones

Unidad de negocios **MATERIALES**

Modelo altamente escalable, comercialización a nivel global de insumos de impresión 3D para fabricantes de dispositivos médicos

Filamentos
Tecnología FDM



Resinas líquidas
Estereolitografía



Polvo polímero
Sinterizado Láser



Clientes y Distribuidores actuales

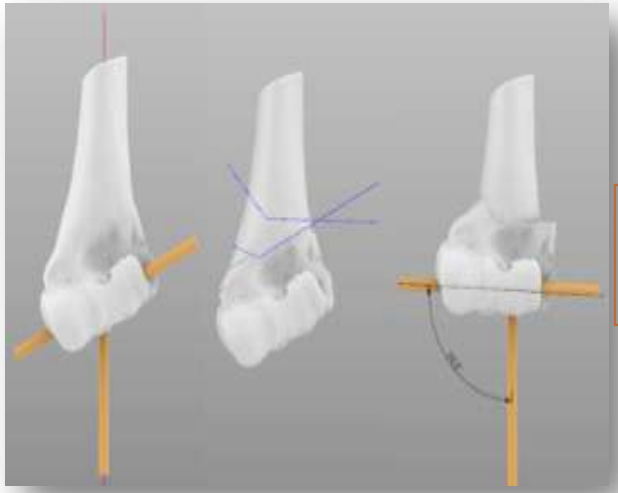


Unidad de negocios **MEDICINA PERSONALIZADA**

Lo Complejo hecho Simple – Alto Valor Agregado

Instrumentación quirúrgica de precisión, paciente-específico.

Planificación quirúrgica



Diseño y fabricación única



Precisión extrema



Paciente en inmejorable recuperación, sin infecciones



PRESENCIA Y TRACCIÓN

En ejecución, US$300k





COPPER 3D



Claudio Soto
Director Médico



Andrés Acuña
CEO



Jorge Zúñiga
Investigador Biomecánica



Enzo Marzullo
Advisor Técnico-Comercial



Diego Godoy
Diseñador Biomédico



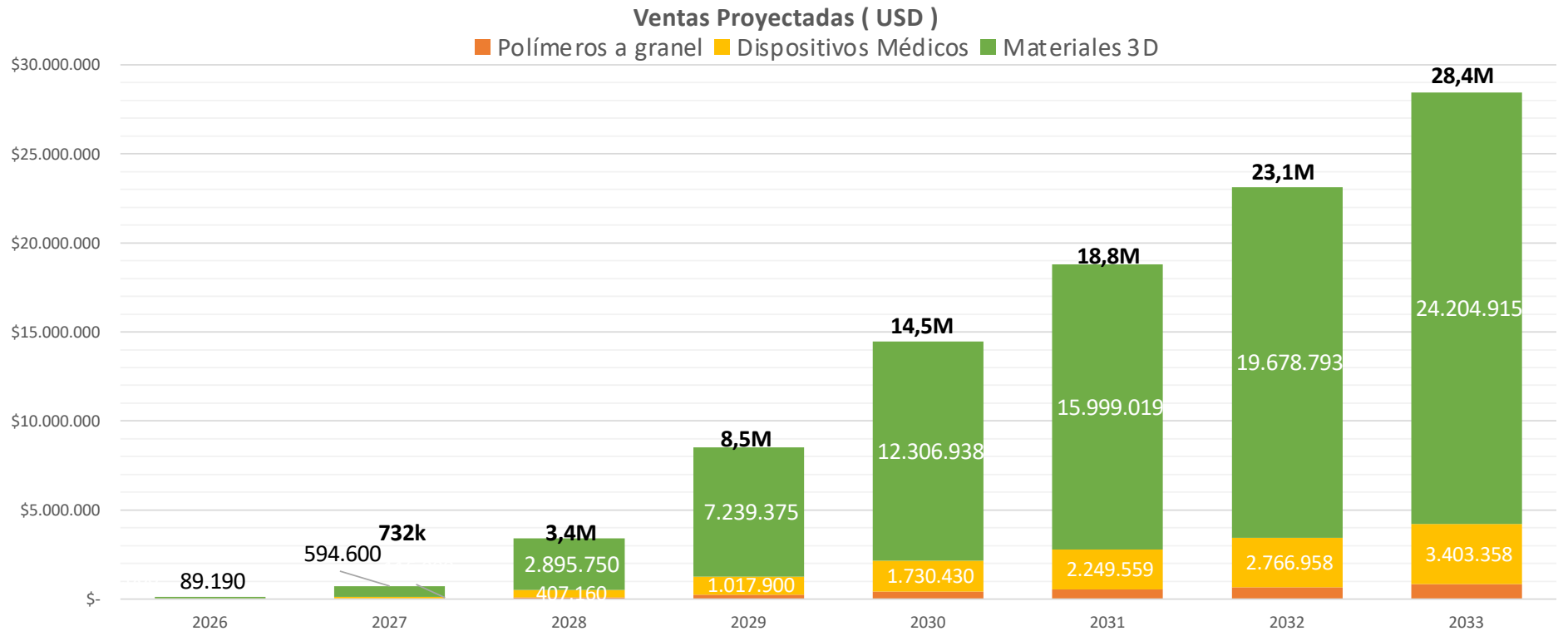
Valia Mimiça
Advisor Estrategia

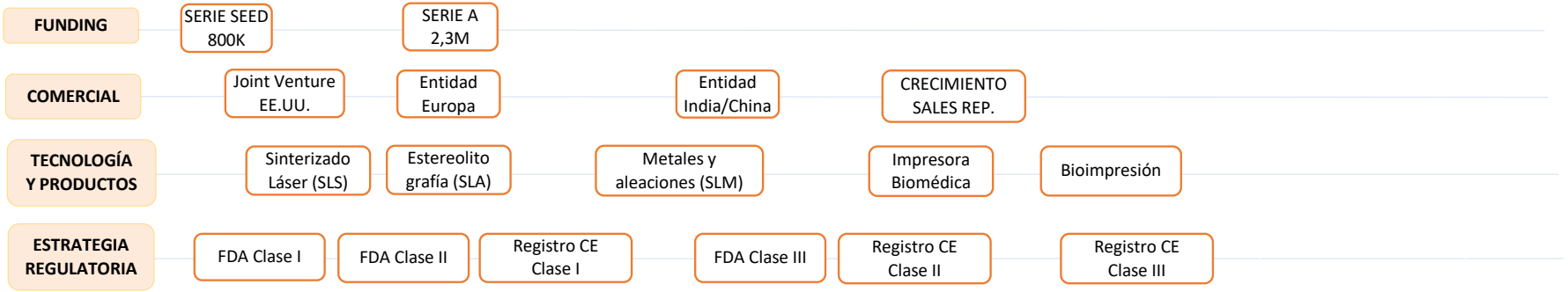


Rakesh Srivastava
Partner en EE.UU.

Equipo Senior
con experiencia y
capacidades
en Medicina,
Ingeniería,
Investigación
y Comercialización

Nuestra proyección de ventas se basa en innovación continua, tecnologías propietarias y expansión internacional, respaldadas por ventajas competitivas debido a gestión regulatoria





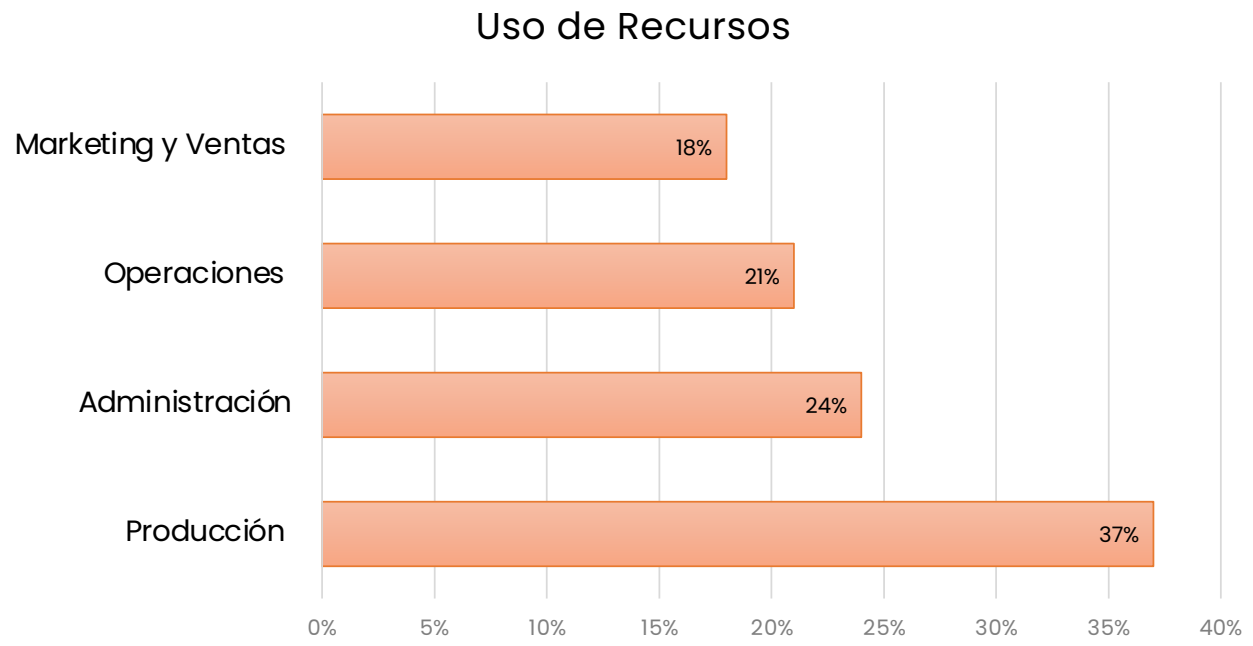
Respaldado por EY Building a better working world Acelera Latam

SERIE SEED

- **DIVERSIFICAR EL PORTAFOLIO**
- **AMPLIAR GEOGRAFÍAS (US & EU)**

La ronda Seed es de **US$ 800k**:

- US$ 300k para inversionistas ángeles (ticket desde US$ 20k),
- US$ 300k comprometidos por un fondo institucional, y
- US$ 200k por asignar a un fondo de inversión estratégico.



COPPER 3D

INVITACIÓN

Invierte en el futuro
de la Bioseguridad Clínica,
que salva vidas y transforma mercados



Gracias por tu interés!



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ANEXOS



MEDICIÓN DE IMPACTO



ANÁLISIS DE COMPETITIVIDAD



¿QUÉ HACEMOS CON NASA?



ESTRATEGIA DE EXIT

IMPACTO

50% Disminución tiempo uso pabellón

Con instrumentación personalizada, el tiempo por cirugía disminuye y esto habilita procesos de optimización clínica aumentando accesibilidad

< 30% uso de energía y exposición a radiación

El menor tiempo de cirugía se traduce en menor consumo de energía de equipamiento médico y exposición a rayos X del personal de salud

< 60% emisiones gases efecto invernadero

El menor tiempo de uso de anestesia, y los gases asociados (sevoflurano), reduce las emisiones por cirugía unitaria

< 70% costo por cirugía

Reducción en el exceso promedio de costo por infección asociada a una cirugía (ref. artroplastía)



ANÁLISIS DE COMPETITIVIDAD

	COPPER 3D	ANTIMICROBIAL INJECTION MOLDING	MECHANICAL & CHEMICAL CLEAN	ANTIBIOTIC FILM OVER DEVICES (GOLD STD)	ANTIMICROBIAL FILAMENTS (OTHERS)	REGULAR MATERIALS FOR 3D PRINTING
WHO		Large Companies	From Hospital to End-user	Large Companies	Small Companies	Diverse Manufacturers
PERSONALIZED MEDICINE	✓	⊘	✓ With limitations on several shapes	✓	⊘	✓
ACCESSS	✓	⊘	Sterilization Service may be difficult or expensive	Expensive Cold Chain Managment Dedicated Facilities	✓	✓
ANTIMICROBIAL PERFORMANCE	✓	✓ (regularly)	⊘	✓	Active ingredients not informed	⊘
SCIENTIFIC BACKGOUND	✓ Biocompatible tested EPA and FDA registered	✓ (typically on request)	✓	✓	Biocompability and other technical information are not available	⊘
COMMERCIAL	Unreasonable Company & Marca Chile recognition Portfolio in expanding to SLA and SLS technologies	Brands with existing presence	Diverse	Brands with existing presence	New or small brands with world recognition limited. No additional products in other Additive Manufacturing technologies	Diverse

ESTRATEGIA DE SALIDA

Cómo?

Adquisición dentro de 5 - 7 años
Alternativamente, fusión con una Compañía mayoritaria

Quién?

Johnson & Johnson, stryker, materialise, Medtronic, hp invent, SPACEX, General Electric, stratasys, SIEMENS, NatureWorks, medartis, 3D SYSTEMS, formlabs, REDWIRE

Porqué?

Para dar cumplimiento a regulaciones de dispositivos médicos impresos en 3D
Para expandir las soluciones ofrecidas por proveedores de impresión 3D

Ejemplos

ZARE acq. PROXERA (Dental 3DPrinting), DESKTOP METAL acq. EnvisionTEC (Polymer Additive Manufacturing, US$300M), 3D System acq. Additive Works GmbH (Optimization of industrual 3D Printing), y otras.
https://3dheals.com/healthcare-3d-printing-mergers-and-acquisitions-2021-review/

CENTER FOR RESEARCH IN HUMAN MOVEMENT VARIABILITY

COLLEGE OF EDUCATION BIOMECHANICS

DEVELOPMENT AND TESTING OF A RECYCLABLE ANTIMICROBIAL MATERIAL FOR IN-SPACE MANUFACTURING OF MEDICAL DEVICES

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COPPER 3D ANTIBACTERIAL INNOVATIONS

INTRODUCTION

A recent NASA report has demonstrated that a MRSA strain exhibited enhanced antibiotic resistance in microgravity-analogue conditions suggesting potential alterations in antibiotic efficacy during long-duration spaceflight (Figure 1). Furthermore, given that medical conditions will occur during human spaceflight missions, there is a possibility of adverse, unpredictable health outcomes and decrements in performance and health during these missions [4].

PURPOSE: The purpose of this research can be separated into three aims: (i) development of a recyclable, antimicrobial polylactic acid-based material compatible with the Additive Manufacturing Facility (AMF) on the ISS, (ii) antimicrobial and mechanical characterization of new material with a replica of the AMF on-ground, (iii) mechanical and antimicrobial characterization of test coupons and 3D printed medical devices manufactured on-ground and on-orbit. Currently there are technology gaps regarding the mitigation of microbial growth during spaceflight missions, the ability to repurpose materials, and the development of antimicrobial materials tailored for spaceflight applications. Thus, there is a critical need for the development of preventative countermeasures for medical devices associated with bacterial development, and antimicrobial PLA shows promise to address those gaps. [1-3]

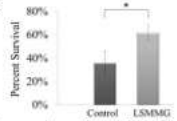


Figure 1. MRSA survival percentage when cultured in microgravity analogue introduced to ciprofloxacin (antibiotic) is higher than the survival percentage of MRSA in a typical gravity environment.

METHODS

Polylactic Acid-based Filament Development- The addition of a copper antimicrobial nanocomposite to pellets at different concentrations facilitated the development of a multipurpose polylactic acid-based antimicrobial filament. Preliminary testing shows that the addition of copper nanocomposites gives the PLA high antimicrobial properties. The recyclable characteristic of this material facilitates the production of new antimicrobial medical devices in an austere environment, such as the ISS.

Mechanical and Antimicrobial Testing of PLA Coupons Printed On-Ground- The coupons printed with the on-ground replica of the AMF will be characterized for mechanical and antimicrobial properties. The mechanical testing of this material will follow the ASTM standards D638 for tensile testing and D695 for compression testing. The antimicrobial efficacy testing will follow the ISO 22196 standard before and after a heat-based age accelerating agent (equivalent to 1 year) and will be conducted by an independent laboratory (Situ Biosciences LLC, wheeling, IL, Chicago, USA). [2]

Mechanical and Antimicrobial Testing of PLA Coupons and Medical Devices Printed In-Space at the AMF- The highest quality spool will go through all the necessary pre-launch new materials testing and compatibility testing. Once those tests are completed and the material is manifested on a launch, a spool will be upmassed to the ISS with a specially designed extruder for coupon manufacturing in the AMF. The coupons will then be returned to Earth for characterization. The testing of this group of coupons will be the same as the coupons that have been manufactured in the on-ground replica. On top of this, a basic surgical kit will be designed with a CAD program which will be compatible with the AMF. These medical devices will undergo tensile testing under the ASTM standard D5083, as well as flexural testing under the ASTM standard D790 based off previous literature [1].

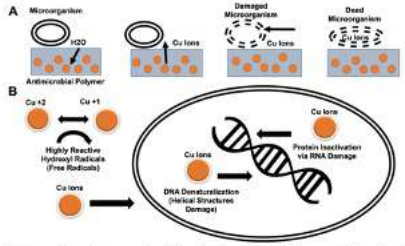


Figure 2. Speculated Theoretical Mechanisms for Enhanced Antimicrobial Behavior of Additive Manufacturing Polymers:
A) Antimicrobial polymers facilitate microorganism adsorption, which results in water diffusion through the polymer matrix. Once the water reaches the nanoparticles, they corrode or dissolute, which releases copper ions to damage the microorganism's membrane. The metal ions can then diffuse into the interior of the microorganism.
B) Copper nanoparticles damage polyunsaturated fatty acids of the cell membrane producing leakage of cellular solutes that feed redox cycling between Cu2+ and Cu1+ and produce highly reactive hydroxyl radicals. Copper radicals subsequently damage cell membrane lipids, proteins, DNA and RNA helical structures, and other biomolecules: useful in deactivating a wide array of viruses.



Figure 3. Manufacturing process of antimicrobial medical devices using recyclable, antimicrobial polylactic acid- based 3D printing filaments.



Figure 4. Additive Manufacturing Facility at ISS

ACKNOWLEDGEMENTS

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PRELIMINARY RESULTS

Table 1. Antimicrobial analysis of PLA with 1% copper nanoparticle additive before and after accelerated aging

Test Method	ISO 22196 - Measurement of antibacterial activity on plastic surfaces		
Sample # 1	PLActive, Apple Green, Native State (No Aging)	Interval	Result
	Inoculum: *S. aureus (MRSA) (33592)*		
	>99.99% reduction	24 hr	4.7 Log10 Reduction
Sample # 2	PLActive, Apple Green, Native State (After Aging)	Interval	Result
	Inoculum: *S. aureus (MRSA) (33592)*		
	90.86% reduction	24 hr	1 Log10 Reduction

Preliminary work performed by our lab showed bacterial analysis of the polylactic acid- based filament with 1% antibacterial nanoparticle additives was up to 99.99% effective against MRSA. The material showed a 90.56% reduction after one year of simulated aging (Table 1). The printability of the device was similar to standard polylactic acid. The extrusion and manufacturing process of the material did not affect the antimicrobial properties of the filaments and was able to successfully manufacture medical device prototypes (Figure 5) [2].



Figure 5. Prototypes of medical devices manufactured with antimicrobial material.
A) Small medical device kit specialized for debridement
B) Finger orthosis

EXPECTED RESULTS & CONCLUSIONS

Preliminary results on the antimicrobial efficacy of the PLA with a copper additive showed that the material was up to 99.99% effective against two *Methicillin-resistant* (MRSA) and standard *Staphylococcus Aureus* strains. After a year of accelerated aging, the material still showed a 90.86% reduction against MRSA [2]. It is expected that this material will provide similar results when printed on the ISS, as microgravity does not have a significant impact on material properties if the proper printing parameters are selected [3]. Thus, the use of antimicrobial 3D printed materials has promising potential applications for manufacturing a wide range of medical devices associated to bacterial control in austere environments such as space.

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COPPER 3D ANTIBACTERIAL INNOVATIONS

COLLEGE OF EDUCATION BIOMECHANICS

University of Nebraska Omaha

COPPER 3D

¿QUÉ HEMOS HECHO CON NASA?

(Press Release)

(*) Publicación original


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ANTIMICROBIAL INNOVATIONS