

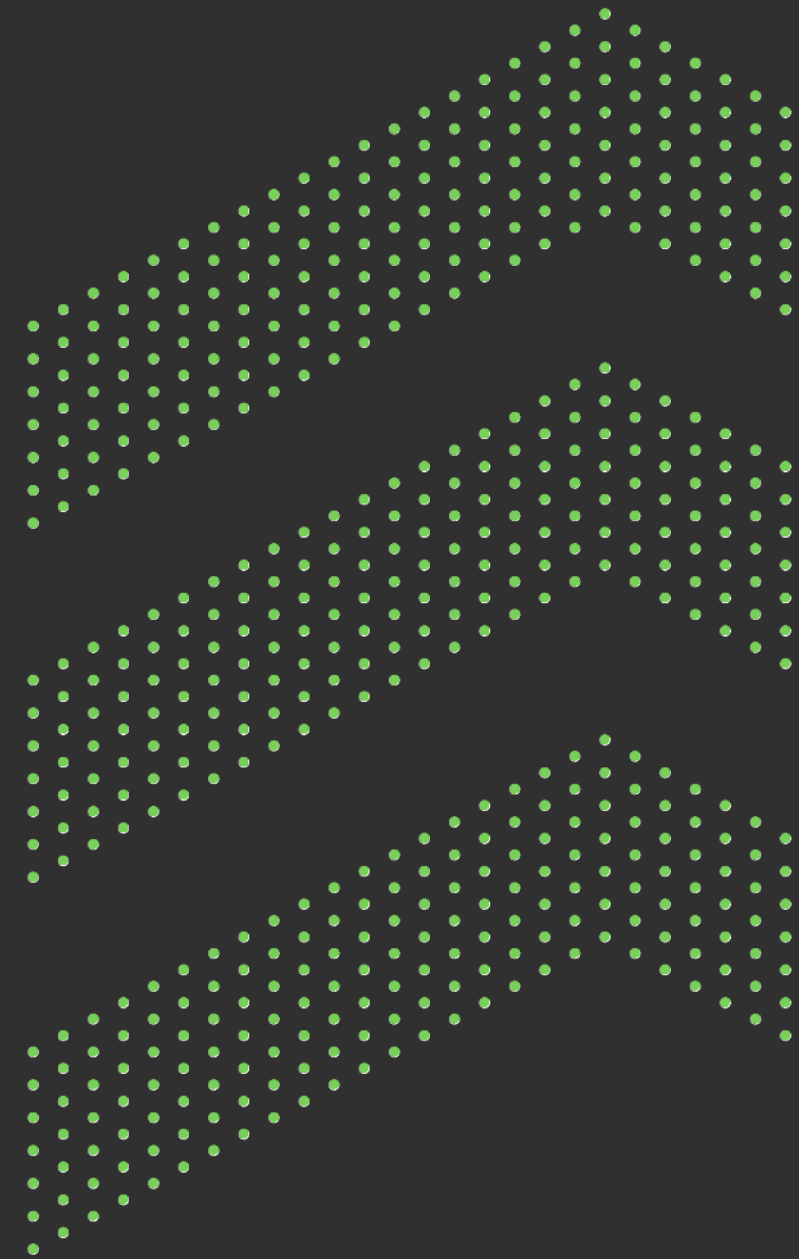


Additive Manufacturing of Technical Ceramics For Medical Applications

Advancements and Innovations
in Medical Technology

PRESENTED ON AUGUST 1, 2024 BY:
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SiNAPTIC Today

Global Expansion and Business Distribution



The Future of SiNAPTIC

Global Expansion and Business Distribution

Business Distribution

From coast to coast, each facility has a specific focus to help scale SiNAPTIC's business and customer audiences.



- Innovation Hub
- R&D
- Production
- Service & Technology

Technical Ceramics Additive Manufacturing and Product Solutions



From industry to medicine, we are dedicated to developing, on-demand manufacturing, and commercializing 3D printed technical ceramic products to improve lives and inspire the world to see in new ways.

In addition to industrial applications, SiNAPTIC was founded on the development and production of silicon nitride (SiN) for medical applications, including but not limited to Orthopaedics and Spine.

Silicon Nitride (Si₃N₄)



Maximizing efficiency and improving product quality throughout the manufacturing process



State-of-the-art manufacturing facility and headquarters in **Broomfield, Colorado**, with a second **midwestern facility to break ground in 2025**.



Best-in-class team of **experts** specializing in **research and development, strategy and commercialization** with a rigorous **quality control** process.



Research center and design suite with **six Lithoz CeraFab S65 Medical printers**, **four ovens**, **two nitrogen furnaces**, **thermal processing-equipped**, and a full compliment of **pre/post-processing equipment**.



Concept to **design, rapid prototyping**, and **serial production** focusing on **standardization, scalability, automation, lean and just-in-time manufacturing**.

SiNAPTIC Technologies Receives Colorado State Grant to Advance Ceramic Additive Manufacturing Technology

BREAKING NEWS



Expand Technology & Production-Grade Materials

Awarded an Early-Stage Capital and Retention Grant through the Colorado Office of Economic Development and International Trade (OEDIT) Advanced Industries Accelerator program.

Grant Funding and Project

This funding will help further the development of SiNAPTIC's printable silicon nitride slurry through testing toward the submission of an FDA Master File.

What Sets Us Apart

Upon the completion of this grant-funded project, innovators will have the opportunity to license our silicon nitride slurry to develop their own medical products for the regulatory benefits offered by the Master File.

Benefits of Si₃N₄ for Medical Device Implants

Silicon Nitride is a bioactive advanced ceramic material highly tunable surface chemistry and composition ideal for use in MedTech because of these advantages:

- Demonstrated high cell adhesion
- Enhanced osteoconductivity
- Pronounced hydrophilicity that attracts and adsorbs bone growth proteins
- Superior bacterial resistance
- Reduced bacterial adhesion decreases likelihood of revision surgery due to infection
- Provides clear radiographic visibility

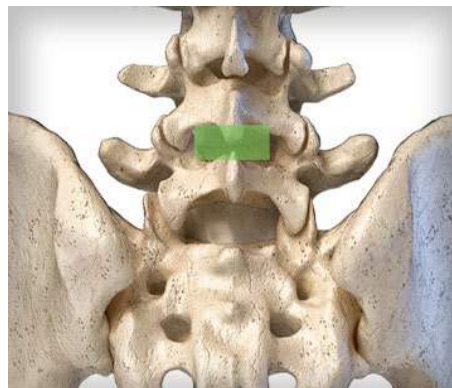


Heimann, R.B. Silicon Nitride, a Close to Ideal Ceramic Material for Medical Application. *Ceramics* **2021**, 4, 208–223. <https://doi.org/10.3390/ceramics4020016>

Areas of Focus for SiNAPTIC Surgical



FOOT & ANKLE



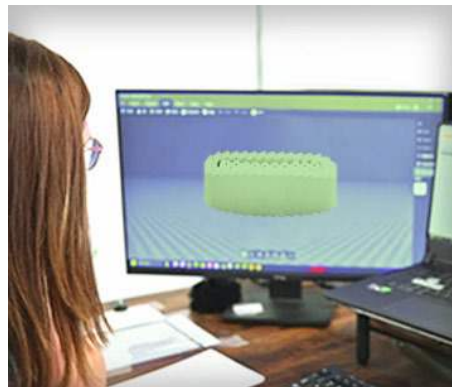
SPINE



HAND & WRIST



BIOLOGICS



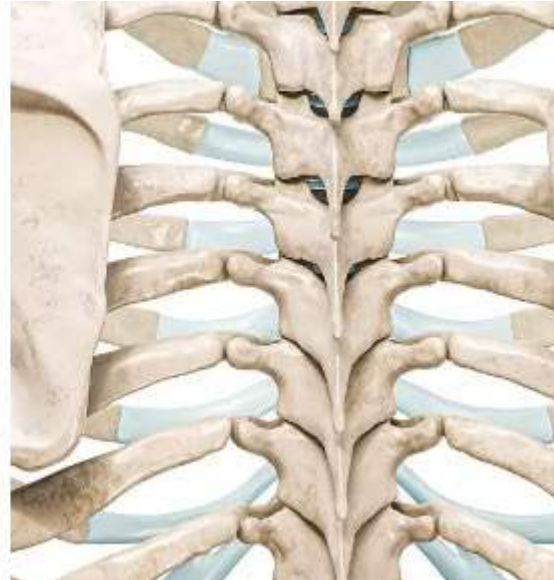
DIGITAL TECHNOLOGY



CUSTOM, PATIENT-SPECIFIC



Technical Ceramics in Medical Applications Today



Orthopaedics

- Foot and Ankle
- Hand and Wrist
- Shoulder and Elbow
- Adult Reconstruction
- Oncology
- Trauma
- Sports Medicine
- Osseointegration
- Patient-Specific
- Customs
- Biologics

Spine

- Cervical
- Thoracic
- Lumbar
- SI Joint
- Customs
- Biologics

Dental

- Implants
- Social Six
- Crowns & Bridges
- Orthodontic Devices
- Veneers
- Inlays/Onlays
- Bone Restoration

Other Medical

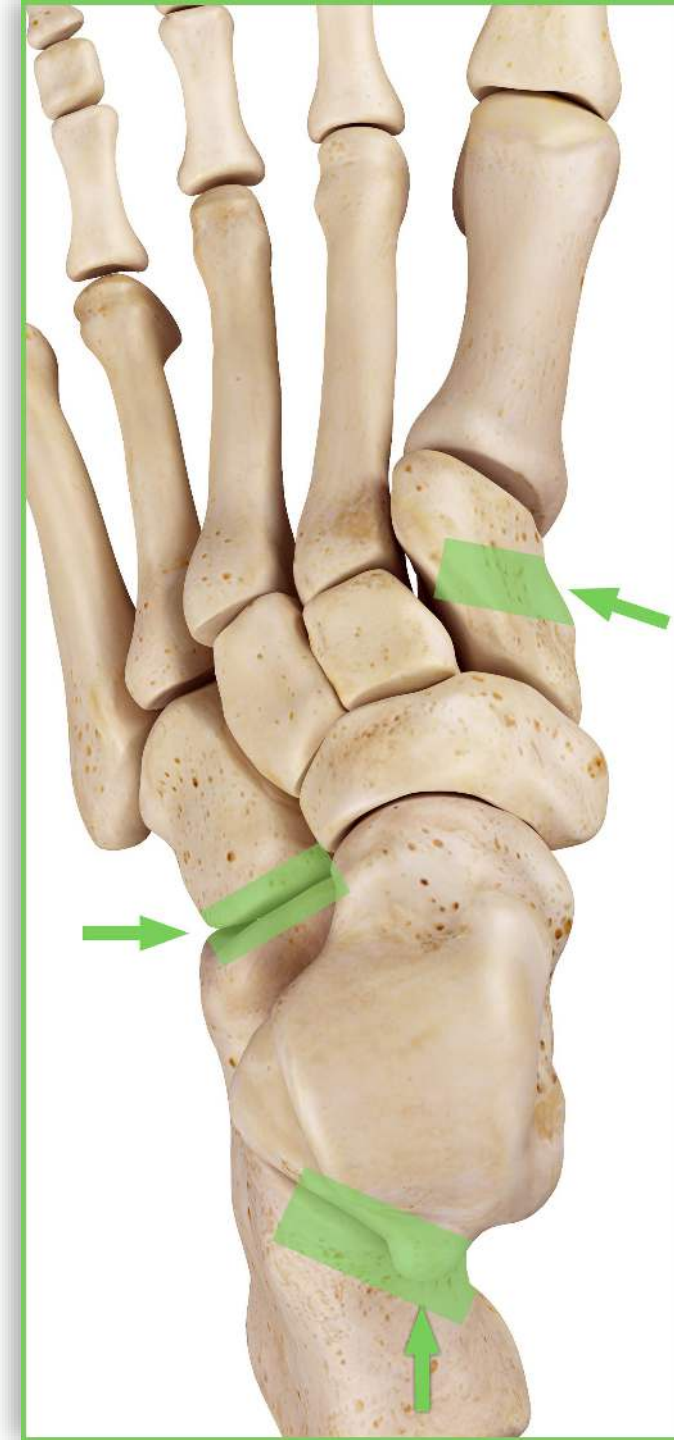
- Oral Maxillofacial OMF
- Craniomaxillofacial CMF
- FemTech
- Surgical Instruments
- Medical Disposables

Surgeon Labs | Innovative F&A Product Development



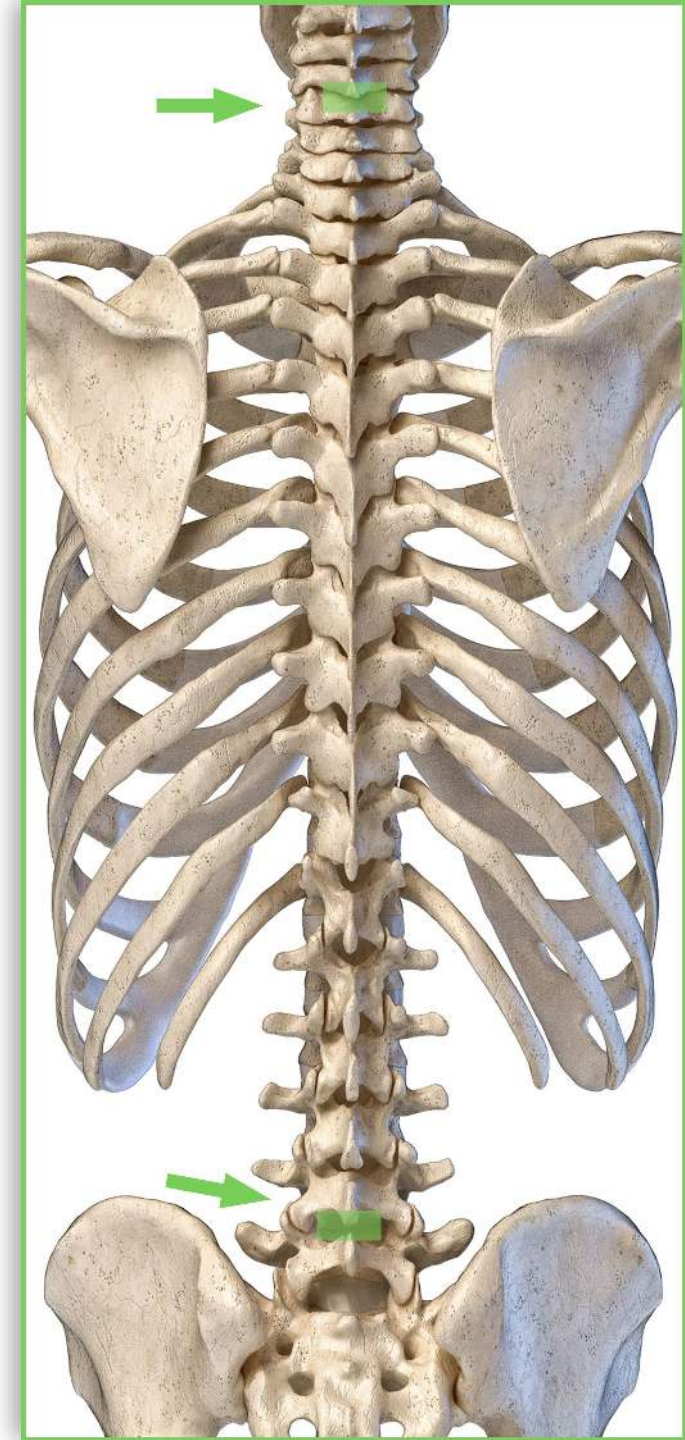
Innovative Treatments in the Foot

- 🏠 The **Evans osteotomy** is a lateral column lengthening osteotomy
- 🏠 The **Cotton osteotomy** is a medial cuneiform opening wedge osteotomy
- 🏠 The **Subtalar distraction arthrodesis (SDA)** treats complications from certain heel bone (calcaneal) fractures and joint arthritis



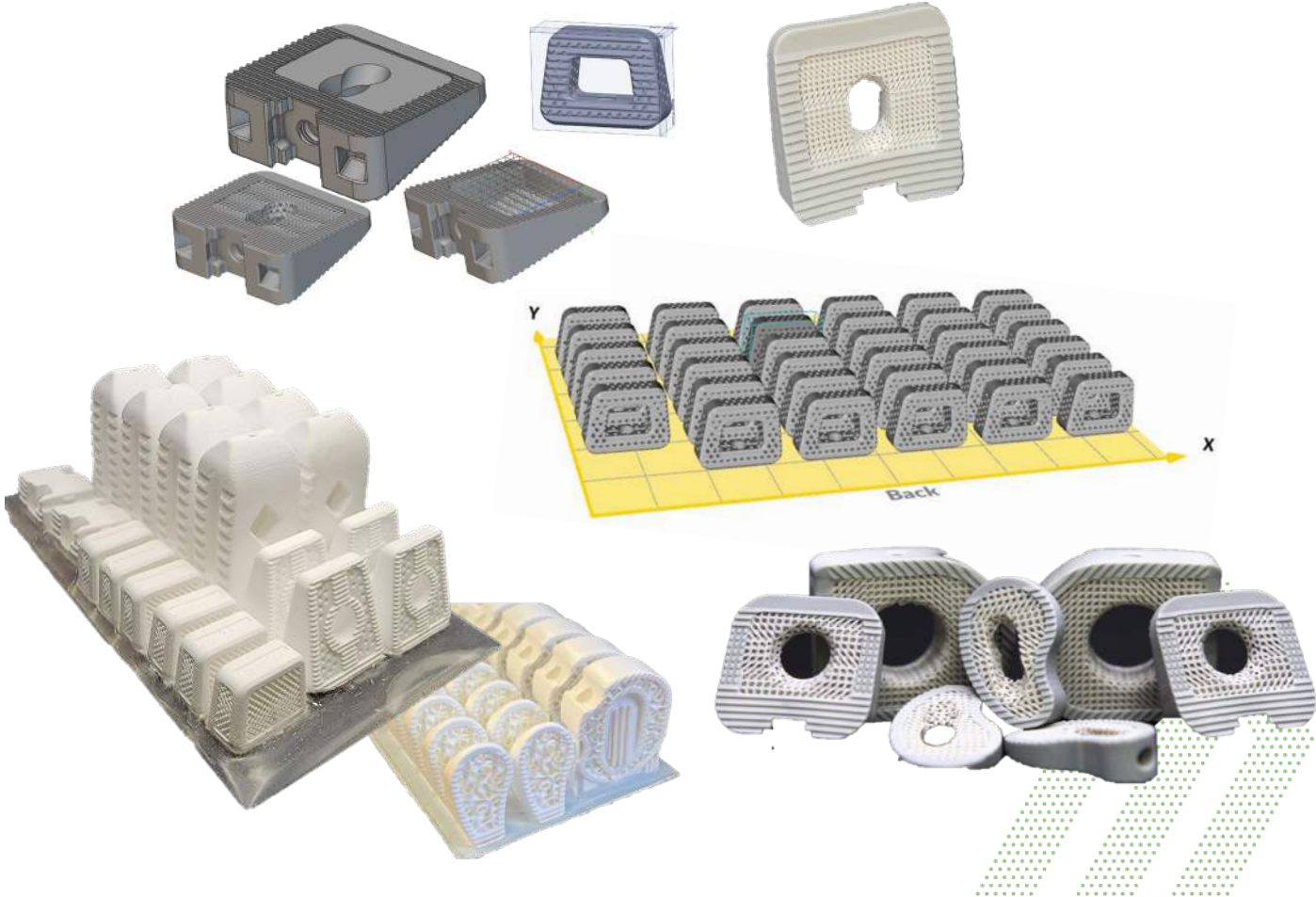
Interbody Cages for Spine Fusion

- 🏗️ **Cervical fusion (ACDF)** anterior cervical discectomy and fusion (ACDF)
- 🏗️ **Lumbar interbody fusion (LIF)** performed to remove the degenerated disc(s) while restoring the space between the vertebral bodies



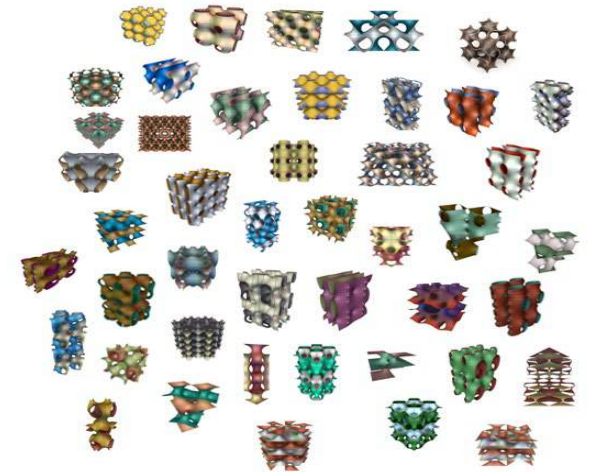
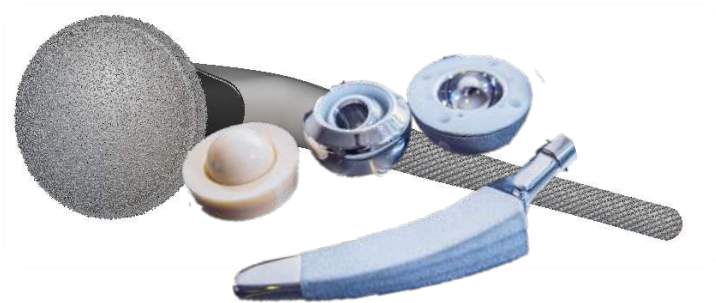
From Concept to Prototype and Full Serial Production

- Regulatory Pathways Considered
- Concepts
- Prototype
- Refine
- Small Batch Production
- Scale
- Serial Production
- Access



The Future of Additive Manufactured Ceramic Implants

- Customized implants designed for specific patients
- Engineered surface compositions that resist monoculture and co-culture bacterial strains
- Tailored lattice structures to accommodate challenging porosities
- Implants that do not require bone graft chambers
- Multi-material and advanced drug delivery system implants
- Partnerships like Mercury Bio and Himed



The Future and Building Strategic Partnerships

SYNERGIES AND VALUE CREATED THROUGH THE PARTNERSHIP

BIOCERAMICS MANUFACTURER

Wide range of custom CaP-based biomaterials and surfaces



BIOTECH INDUSTRY LEADERS

Global provider with over 30+ years of biotech experience



SERIAL PRODUCTION

Bringing products to life through large-scale commercialization



APPLICATIONS

Transportation, Aerospace & Defense, Energy, Electronics, Semiconductors, Medical



himed

Biomaterial laboratory and material development

LITHOZ

Specializing in printing technology and materials

SiNAPTIC

Bringing products to life through serial manufacturing across multiple applications

mercury bio

ADDs™
Advanced Drug Delivery System

mercury bio

INNOVATIVE TECHNOLOGY

The world market and innovation leader for ceramic 3D printing



TAILORED SOLUTIONS

Aimed to meet the specific needs of different industries and applications

