NanoTec™

ADVANCED SURFACE TREATMENT

ACTIVATE · ACCELERATE · INTEGRATE

αtec™ INFORMED BY EOS

NanoTec
ADVANCED SURFACE TREATMENT

NanoTec is a surface treatment technology that produces a **biomimetic** surface nano-topography that is hydrophilic and **osteoconductive**.[1,2,3,4]

Issues with Traditional Implants[5,6]

SOLID TITANIUM (Ti)

- Subsidence
- Bone growth limited to within apertures

PEEK

- Bioinert
- Hydrophobic
- Fibrous tissue encapsulation
- Bone growth limited to within apertures

3 Benefits

ACTIVATE

protein adsorption and cell attachment by creating a hydrophilic surface.[7,8,9]

ACCELERATE

a biological response by creating a bone-like HA surface nano-topography intended to enhance osseointegration.[1]

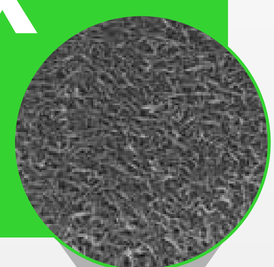
INTEGRATE

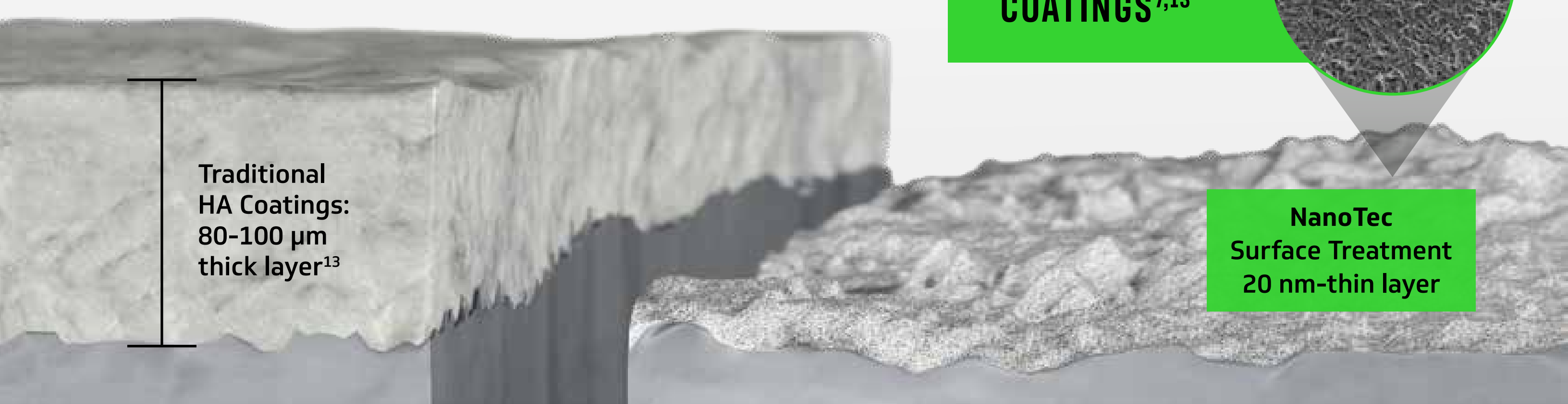
new bone growth onto and around treated implants to promote stabilization.[4,10,11,12]

"Cell-material interaction contributes to integration of implants with the surrounding bone… I have high confidence that NanoTec implants could lead to a ***fast path to fusion*** *for my patients."*

AARON KUNKLE, DO
Florida Spine Associates
West Palm Beach, FL

NANOTEC IS 5000X THINNER THAN TRADITIONAL COATINGS[7,13]





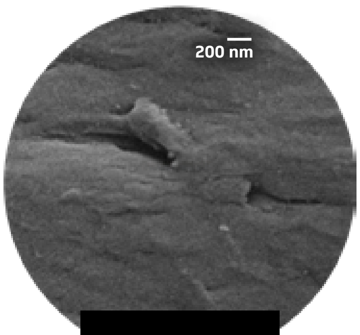
NanoTec
ADVANCED SURFACE TREATMENT

Activate

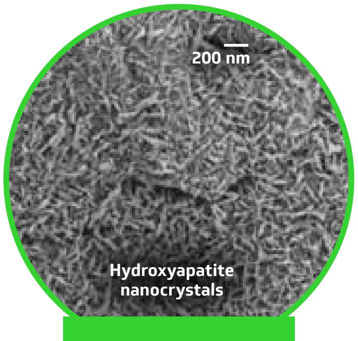
protein adsorption and cell attachment by creating a hydrophilic surface.[7,8,9]

SURFACE NANO-TOPOGRAPHY

The 20 nm-thin layer of hydroxyapatite (Nano-HA) **mimics** the shape, composition, and structure of HA found in human bone.[9]

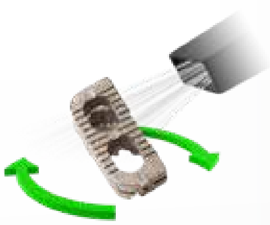


UNTREATED PEEK[7]



NANOTEC TREATED PEEK[7]


Application of Coating Liquid


Rotation Process for 20 nm-Thin Film Formation


Heat Treatment

THE PROCESS

The surface treatment process is applied to all surfaces and internal architecture, creating **bioactive** interfaces intended to enhance bone growth.[7]

HYDROPHILIC IMPLANT SURFACE

- Implant surface nano-topography increases surface wettability, **enhancing protein adsorption and cell attachment**.[7,8]
- Higher wettability can lead blood and extracellular fluids to spread at a faster rate on a NanoTec-treated surface compared to an untreated surface.[7,9]


UNTREATED PEEK: HYDROPHOBIC[14]


NANOTEC-TREATED PEEK: HYDROPHILIC[14]

Accelerate

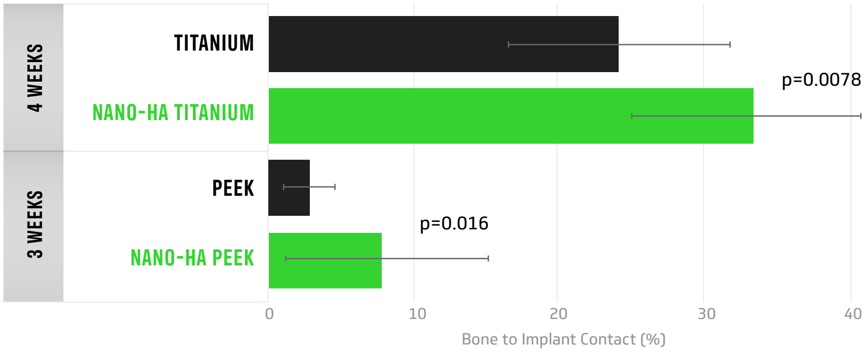
a biological response by creating a bone-like HA surface nano-topography intended to enhance osseointegration.[1]

OSTEOCONDUCTIVE POTENTIAL

NanoTec helps **accelerate** bone cell attachment, proliferation, and differentiation faster than untreated surfaces.[4,10]

FASTER BONE FORMATION

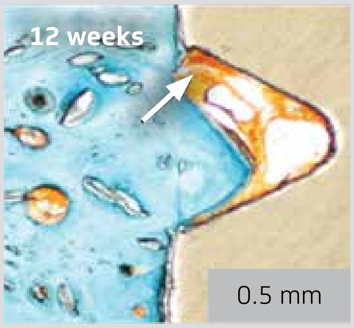
- In Ti implants, Nano-HA treatment resulted in **1.4x** increased bone-to-implant contact (BIC) 4 weeks after insertion into rabbit femurs.[2]
- In PEEK implants, nano-HA resulted in **2.7x** increased BIC contact 3 weeks after insertion into rabbit femurs.[3]



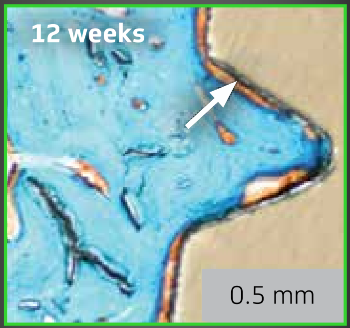
DECREASED FIBROUS TISSUE

In a rabbit model, nano-HA PEEK implants had decreased fibrous tissue on the tibia and implant interface compared to untreated PEEK implants (see arrows).[3]

UNTREATED PEEK

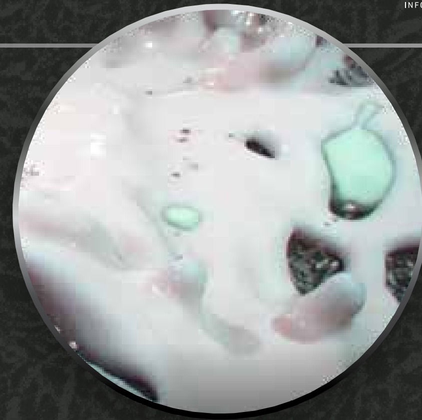


NANO-HA PEEK



RAY OSHTORY, MD
Pacific Heights Spine Center
San Francisco, CA

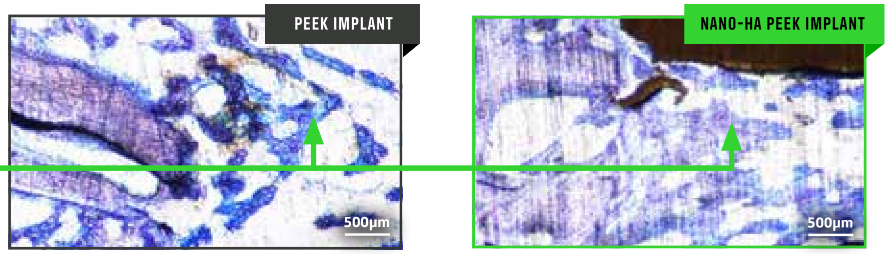
*"Fibrous encapsulation around PEEK resists complete integration of the implant and may lead to implant subsidence and nonunion. NanoTec provides a combination of **high wettability and optimized nano-topography that mediates bioactivity** and allows for protein adsorption. These properties positively influence tissue regeneration on the surface and may therefore lead to **better integration** of the implant."*



Integrate

new bone growth onto and around treated implants to promote stabilization.[4,10,11,12]

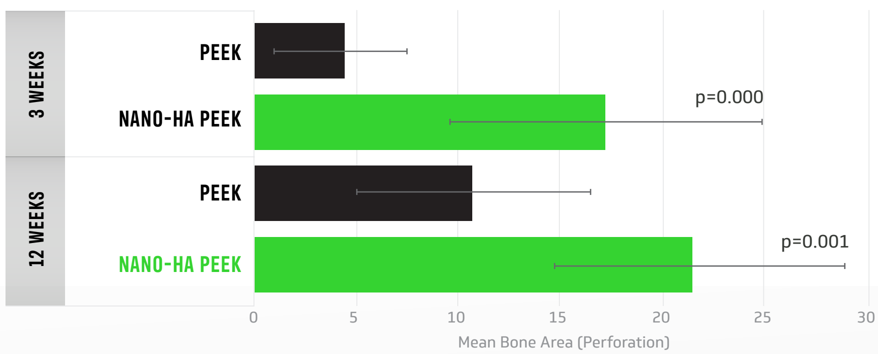
HIGHER VOLUME OF BONE IN THE HOLLOW IMPLANT SECTION OF THE NANO-HA PEEK IMPLANT



INCREASED BONE AREA

Implants in rabbit femurs were evaluated for new bone growth at 3 and 12 weeks after surgery.[4]

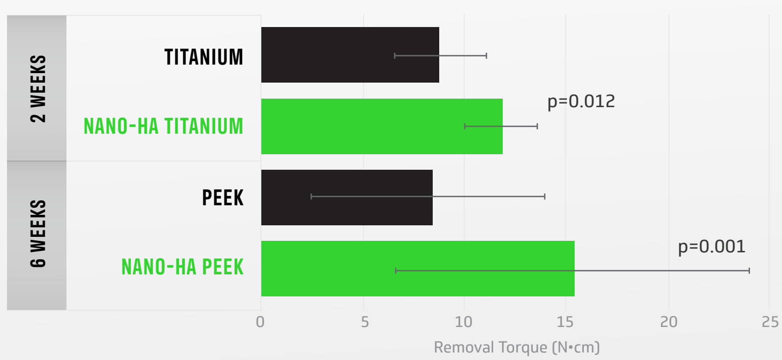
- 3 weeks: Nano-HA PEEK implants had **3.8x** higher bone area in the hollow implant section compared to untreated PEEK implants.[4]
- 12 weeks: Nano-HA PEEK implants had **2.0x** higher bone area in the hollow implant section.[4]



HIGHER OSSEOINTEGRATION STRENGTH[11]

Implants in rabbit tibia were evaluated at 6 weeks after surgery.[10]

- Nano-HA Ti surface demonstrated **1.4x** higher removal torque strength in comparison to an untreated Ti surface.[10,15]
- Nano-HA PEEK surface demonstrated **1.8x** higher removal torque strength in comparison to an untreated PEEK surface.[10,15]



NO DELAMINATION, SHEAR, OR CRACKING

Insertion and removal of PEEK interbody cages with and without the NanoTec surface treatment were simulated in sawbones.[7] NanoTec PEEK implants indicated no delamination, shearing, or cracking during impaction.[7]

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Pre-clinical data may not be representative of clinical reaults.

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