



## NANOSCALE FIBERS FORTIFY COMPOSITE

Company reports that composite made with its nanofiber technology is stronger, longer-lasting and has low shrinkage stress.

► page A4



## HYGIENE TRIBUNE

### BABOON TAKES DENTAL CARE SERIOUSLY

Female hamadryas baboon in U.K. zoo uses bristle from broom to floss.

► page B1



## IMPLANT TRIBUNE

### PRACTICAL EDUCATION

American Academy of Implant Dentistry delivers 'practical education for the practicing implant dentist.'

► page C1



# Nanodiamonds might help prevent tooth loss after root canals

*UCLA research shows the particles enhance gutta-percha strength and infection control*

People undergoing root canals may have gained a powerful, if tiny, new ally. Researchers from the UCLA School of Dentistry have found that using nanodiamonds to fortify a material used in the procedure could significantly improve outcomes for patients.

A paper on their research is published in a recent issue of the peer-reviewed journal ACS Nano.

Nanodiamonds are tiny particles formed as byproducts of diamond refining and mining. Thousands of times smaller than the width of a human hair, they have been widely explored for use in dentistry, cancer therapy, imaging and regenerative medicine, among other applications.

Each year, more than 15 million root canal procedures are performed in the United States. Dentists' goal is to save their patients' teeth from infected dental pulp. During a root canal, inflamed dental pulp is removed and the empty space is then filled in with gutta-percha, which is used in part because it does not react within the body. But some root canals

don't entirely remove the infection, and residual infection after root canals can lead to tooth loss.

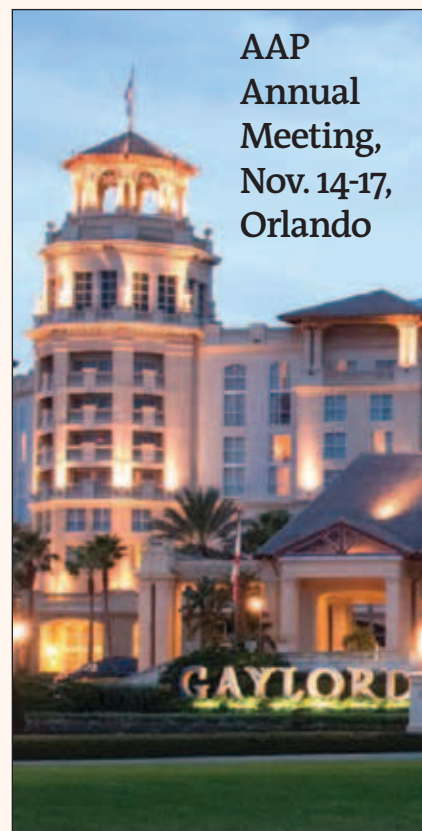
In addition, traditional gutta-percha can have certain shortcomings, including a limited capacity to ward off infection and less-than-optimal rigidity.

To overcome those issues, the UCLA team developed and tested two types of reinforced gutta-percha: one strengthened with nanodiamonds and another strengthened with nanodiamonds that had been pre-loaded with antibiotics.

To evaluate the first type, Sue Vin Kim and Adelheid Nerisa Limansubroto, study co-authors who are UCLA School of Dentistry students, filled actual teeth from human patients. Using conventional radiography and micro-computed tomography, or micro-CT, they showed that the nanodiamond-enhanced gutta-percha could be used to fill the tooth.

Like the traditional formulation, the nanodiamond-enhanced compound did leave small gaps in the canal — where

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AAP Annual Meeting, Nov. 14-17, Orlando

The American Academy of Periodontology (AAP) annual meeting is scheduled to run from Nov. 14-17 in Kissimmee, Fla., the theme-park-packed resort area just outside of Orlando. Host site is the Gaylord Palms and Resort Convention Center. The meeting also includes a three-day exhibit hall and a half-day 'Dental Hygiene Symposium.'

► See Implant Tribune, page C1

## INDUSTRY NEWS

A4-A11

- Dentatus ANEW is a different narrow-diameter implant for different challenges
- VOCO temporary luting material delivers natural appearance
- LVI Core I three-day course enables dentist and team to learn together
- Designs for Vision 'WireLess' headlight is self-contained
- Anutra Medical: Revolutionizing local anesthetic delivery: 'A shot that patients and practitioners love'
- Rhein'83 OT Equator narrow-profile attachment works with all implants
- Nanova Biomaterials' nanoscale fiber makes composite 'stronger and longer-lasting, with low shrinkage stress'

## HYGIENE TRIBUNE

B1

- ADHA white paper analyzes changes in dental hygiene education
- Female hamadryas baboon seen using broom bristle to floss
- Barrier protection critical with any dental-care glove

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VOCO THE DENTALISTS

#### ◀ NANODIAMONDS, page A1

harmful bacteria could grow — but the CT imaging showed that the enhanced material filled the space just as effectively as traditional gutta-percha.

“Validating this novel material in teeth extracted from patients serves as a strong foundation for the potential translation of nanodiamond-reinforced gutta-percha toward clinical testing,” said Dean Ho, a senior author of the study and a professor of oral biology and medicine and co-director of UCLA Dentistry’s Jane and Jerry Weintraub Center for Reconstructive Biotechnology.

#### Supercharged with amoxicillin

In the research’s second phase, the scientists tested nanodiamonds that had been loaded with amoxicillin, a broad-spectrum antibiotic used to combat infection. The drug-reinforced nanodi-

amonds, when combined with the gutta-percha, effectively prevented bacteria growth.

“The nanodiamond-enhanced gutta-percha combines many desirable properties into a single platform, including vastly improved mechanical characteristics and the ability to combat bacterial infection following a root canal,” said Dong-Keun Lee, a postdoctoral scholar in Ho’s lab.

The study involved UCLA researchers with expertise in a wide range of disciplines — materials science, nanotechnology, drug delivery, toxicology, oral radiology, endodontics, microbiology and other fields.

“Through their ingenuity and collaboration, Professor Ho’s team is poised to transform the way that dentistry is practiced,” said Dr. No-Hee Park, dean of UCLA Dentistry and a co-author of the study.

During the next two years, the team

plans to optimize the formulation of the nanodiamond-reinforced gutta-percha and begin clinical trials at UCLA.

Ho is also a professor of bioengineering and member of the UCLA Jonsson Comprehensive Cancer Center and the California NanoSystems Institute at UCLA. Other authors of the study were Albert Yen of the UCLA department of bioengineering and UCLA School of Dentistry; and Akrivoula Soundia, Yong Kim, Wenyan Shi, Dr. Christine Hong, Dr. Sotirios Tetradis, Dr. Cun-Yu Wang and Dr. Mo Kang, all of UCLA School of Dentistry.

The study was supported by the National Cancer Institute, the National Science Foundation, the Wallace H. Coulter Foundation, the V Foundation for Cancer Research, the Society for Laboratory Automation and Screening, and Beckman Coulter Life Sciences.

(Source: UCLA School of Dentistry)

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## DENTAL TRIBUNE

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# Nanoscale fiber strengthens composites

*Result is described as stronger, longer-lasting — and with low shrinkage stress*

NovaPro Flow, designed and created by Nanova Biomaterials, is the first commercial dental composite reinforced by nanofibers. The in-house made hydroxyapatite nanofibers, composed of calcium phosphate minerals, are the secret to NovaPro Flow's high strength, great handling properties and esthetic effects, according to the company.

Teeth, bones and nanofibers have the same structure, all composed of a hard inorganic mineral in a soft organic matrix. For example, the enamel of a tooth is made up of high-volume, needle-like mineral crystals (approximately 15–20 nanometers thick and 1,000 nanometers long) in a small-volume, soft protein matrix. Bone and dentin are made up of plate-like crystals (approximately 2–4 nanometers thick and up to 100 nanometers long) embedded in a collagen-rich protein matrix. By comparison, the nanofibers have a thickness under 100 nanometers in diameter, or 1,000 times smaller than human hair.

Most dental composites comprise only nanoparticles, while NovaPro Flow reinforces the composites with nanofibers, adding several advantages. The strength found in the nanofibers is due

to its one-dimensional nature and large surface area. If you apply a shear force to a bunch of nanoparticles, it is easier for the particles to slide by each other. A fiber, on the other hand, has a solid connection that is stronger to resist bending, shear and tensile forces. In comparison, synthetic bulk hydroxyapatite typically has a tensile strength of approximately 50 MPa, which would not be able to reinforce a dental composite. The large size would also lead to polishing problems. The larger surface area of nanofibers provide better transfer of strength for the fiber and the dental composite alike.

During World War I, A. A. Griffith discovered the correlation between strength and the small size of ceramic materials, such as enamel, by testing different thicknesses of glass.

According to the Griffith theory, these needle-like mineral crystals can reach their theoretical strength, or maximum strength, of a material (several or tens

of GPa) when their diameters are in the nanoscale. Microscopic flaws cause a material to fail, so by creating a nanoscale fiber, statistically, it limits the amount of flaws and provides the ability to reach the material's maximum strength. In addition, such mineral crystals at nanoscale are not sensitive to cracks or stress concentration, which typically

degrades when produced on a micro or macro scale. The fibers are able to bend without breaking. The high strength and low sensitivity to cracks found in natural nanocomposites are the same advantages provided by the nanofiber reinforced NovaPro Flow.

*(Source: Nanova Biomaterials)*



NovaPro Flow, the first composite to add nanofiber technology to today's nano-hybrid composite to significantly improve mechanical performance. Photo/Provided by Nanova Biomaterials

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# Single-bottle adhesive self-cures with no light activation

*Futurabond M+ needs only one coat and 35 seconds*

By VOCO Staff

VOCO recently introduced Futurabond M+, a universal single-bottle adhesive. Futurabond M+ versatility enables it to be used in self-, selective- or total-etch mode without any additional primers on virtually all substrates. Futurabond M+ achieves total-etch bond strength levels with all light-, self- and dual-cure resin-based composites, cements and core buildup materials. With a dual-cured activator, Futurabond M+ will self-cure without any light

activation, which, according to the company, offers a big advantage for endodontic applications such as post cementation where it avoids the pooling effect, a problem with light-cured adhesives. Futurabond M+ also adheres well to metal, zirconia and ceramic, making extra primers unnecessary.

Futurabond M+ needs only one coat and takes 35 seconds from start to finish. Its low film thickness of 9 microns makes bonding margins invisible (i.e. no "halo" effect) and prevents pooling problems. Additionally the material does not need to be refrigerated.

Further Futurabond M+ benefits include its indica-



Futurabond M+ achieves total-etch bond strength levels with all light-, self- and dual-cure resin-based composites, cements and core buildup materials. Photo/Provided by VOCO

tion as a desensitizer for use under amalgam restorations or on hypersensitive tooth necks, as a protective varnish for glass ionomers as well as an intraoral repair of ceramic restorations.

For more information on Futurabond M+ you can visit the VOCO website at [www.voco.com](http://www.voco.com).

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*Rhein'83 OT Equator has reduced vertical profile of 2.1 mm and diameter of 4.4 mm*

Rhein'83, a global producer of precision attachments on removable prosthesis, describes its OT Equator as the smallest dimensional attachment system on the market. It has a reduced vertical profile of 2.1 mm and diameter of 4.4 mm (metal housing included). It is compatible with any implant brand.

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Because of its shape, Equator provides superior stability when compared with traditional attachments, according to the company. It corrects divergence of up to 25 degrees, the company reports. Functionality is guaranteed by coupling of attachment and cap.

Caps are available in four colors, based on levels of retention — from a minimum of 0.6 kg to a maximum of 2.7 kg.

Caps should always be used with metal housing.

### Learn more

To learn more about OT Equator, you can contact the company by email at [info@rhein83usa.it](mailto:info@rhein83usa.it) or by telephone at (877) 778-8383.

You can visit the company online at [www.rhein83usa.com](http://www.rhein83usa.com) to learn more about all of its products and services, including the OT Equator.

(Source: Rhein'83)



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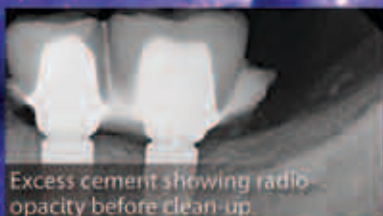
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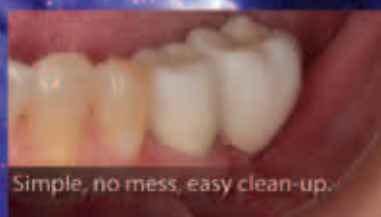
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Wireless and unconnected:

# 'WireLess' headlight is self-contained

Designs for Vision's new LED DayLite® WireLess™ not only frees you from being tethered to a battery pack, but the simple modular design also uncouples the "WireLess" light from a specific frame or single pair of loupes. Prior technology married a cordless light to one pair of loupes via a cumbersome integration of the batteries and electronics into the frame. The compact design of the DayLite WireLess is independent of any frame/loupes.

The patent-pending design of the LED DayLite WireLess is a new concept: a self-contained headlight that can integrate with various platforms, including your existing loupes, safety eyewear, lightweight headbands and future loupes or eyewear purchases. The LED DayLite WireLess is not limited to one pair of loupes or built into a specific eyeglass frame. The LED DayLite WireLess can be transferred

from one platform to another, expanding your "WireLess" illumination possibilities across your eyewear options.

The LED DayLite WireLess weighs only 1.4 ounces and, when attached to a pair of loupes, the combined weight is half the weight of integrated cordless lights/loupes. The LED DayLite WireLess produces more than 40,000 lux at high intensity and 27,000 lux at medium intensity. The spot size of the LED DayLite WireLess will illuminate the entire oral cavity. The function of the headlight is controlled via capacitive touch.

The LED DayLite WireLess is powered by a compact, rechargeable lithium-ion power pod. It comes complete with three power pods. The charging cradle enables you to independently recharge two power pods at the same time and clearly displays the progress of each charge cycle.

## Micro Series: Smaller, lighter, stronger

Designs for Vision has been showing the Micro Series together for the first time this fall. The Micro 3.5EF Scopes use a revolutionary optical design that reduces the size of the prismatic telescope by 50 percent and reduces the weight by 40 percent, while providing an expanded-field full-oral-cavity view at 3.5x magnification.

The new Micro 2.5x Scopes are 23 percent smaller and 36 percent lighter than traditional 2.5x telescopes, and enlarge the entire oral cavity at true 2.5x magnification.

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The LED DayLite WireLess headlight can integrate with various platforms, including your existing loupes, safety eyewear, lightweight headbands and future loupes or eyewear purchases. Photo/Provided by Designs for vision

booths, No. 433, at the AAP meeting, and booth Nos. 2012 and 4625 at the GNYDM meeting. Or arrange a visit in your office by calling (800) 345-4009 or emailing [info@dvimail.com](mailto:info@dvimail.com).

(Source: Designs For Vision)

## Revolutionizing local anesthetic delivery: 'A shot that patients and practitioners love'

*Anutra Local Anesthetic Delivery System provides simple platform for buffering*

By Anutra Medical Staff

"I didn't even know you gave me a shot," Barb said as Dr. Kelly picked up his handpiece and went to work immediately. For decades, the idea of getting a dental injection has terrified patients. Quite frankly, the uncertainty, unpredictability and long onset time of local anesthetic equally terrifies the practitioner.

The Anutra Local Anesthetic Delivery System redefines local anesthetic delivery. It radically enhances patient experience and comfort while transforming a practitioner's efficiency, profitability — as well as the profundity and predictability of local anesthetic.

### Age-old science made simple

Buffering is an age-old science that has been used in the medical community for decades. Buffering is simply taking something acidic, mixing it with something more basic to neutralize the acid.

So why does this matter in dentistry? Lidocaine with epinephrine has a low pH, meaning it is extremely acidic. In fact, its pH is close to that of citric acid, which is found in limes and lemons. Could you imagine injecting lemon

juice into someone's mouth? We simply would not do that.

Much of the burning and stinging sensation comes from the fact that local anesthetic is very acidic. The Anutra Local Anesthetic Delivery System makes buffering simple. By loading an Anutra Cassette at the beginning of the week, clinicians can simply buffer anesthetic for every patient by twisting the knob on the Anutra Dispenser. It could not be easier.

### Topical effect, too

What adds to the amazing power of buffered anesthetic is a topical effect that is a result of a CO<sub>2</sub> microbubble that is formed when local anesthetic is mixed with sodium bicarbonate. Many practitioners report dropping a small amount on the mucosa prior to injecting for a very powerful topical anesthetic.

Not only is patient comfort increased with buffered anesthetic, a practitioner's efficiency is dramatically optimized. Since buffered anesthetic is raised to physiologic pH, the anesthetic crosses the nerve membrane more readily, meaning a patient can reach pulpal anesthesia in as little as two minutes, even with blocks. Additionally, any-

AAP  
BOOTH  
NO. 1531



Not only does the Anutra Local Anesthetic Delivery System provide a simple platform for practitioners to buffer anesthesia in the practice, it also introduces the first-known, FDA approved, multidose, one-handed aspiration syringe that is fully disposable.

Photo/Provided by Anutra Medical

where from 4,000–6,000 times the active molecules of anesthetic will cross the nerve membrane, making it more profound than normal lidocaine as well as increasing the predictability that a patient will get numb the first time, even on those hard-to-numb patients.

### Disposable, multidose, one-handed aspiration syringe

Not only does the Anutra Local Anesthetic Delivery System provide a simple platform for you to buffer in your practice, it also introduces the first-known,

FDA approved, multidose, one-handed aspiration syringe that is fully disposable.

So what does that mean? It means that you can hold up to 6 mL of anesthetic in one single syringe. There is no need to reload cartridges; one syringe can hold the equivalent of at least three traditional 1.8 mL dental cartridges.

According to the company, with its affordable cost, revolutionary new syringe, simple dosing system and long shelf-life, the Anutra Local Anesthetic is a no-brainer for every dental practice.



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