# CONFERENCE PROCEEDINGS

# International Conference on

# "RECENT APPROACHES IN NANO-DRUG DISCOVERY"

# [NANODENTCON - 2K17]

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***ORGANIZED BY:***

**Saveetha Dental College & Hospitals,**
**Saveetha University,**
**Chennai, India**

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**PC- 01**

# NANOROBOTS IN DENTISTRY

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## ABSTRACT

This study focuses on the future applications of nanorobots in dentistry and the challenges and risks galore. Nanorobots are miniature devices designed in the scale of nanometers. Nanorobotics is a part of nanomedicine, which involves the use of molecular tools and thus operating at atomic, molecular and cellular levels. This concept of nanorobotics was first conceived by American Physicist, Richard Feynman. Any recent advancement in technology also steers its way into healthcare as it is the most important field carrying forward the benefits of technology to the laymen. The concept of nanorobotics in healthcare still remains hypothetical and in the research stage, with vast spectrum of applications and an equal number of challenges and risks. In the near future, this concept of nanorobotics is predicted to create a revolution in both medicine and dentistry. The concept of nanorobotics can simplify many dental procedures from administering local anesthesia to the treatment of oral cancer and can also make them as minimally invasive as possible.

**PC- 02**

# NANO-SPONGES – A NOVEL DRUG DELIVERY APPROACH

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## ABSTRACT

In the present scenario, targeting the delivery of a developed drug is of prime focus than the development of new drugs. This can be attributed to the fact that targeted drug delivery, minimizes the adverse reactions and also prolongs and improves drug action to a considerable extent. One such current novel approach in drug delivery is the Nano sponge. Nano sponges are tiny mesh like structures, made up of a backbone of polymers, co polymers and cross-linked esters. These Nano sponges are created using various techniques like Ultra sound assisted synthesis, emulsion solvent diffusion method, etc. Nano sponges keep circulating in the blood until they encounter a target tissue, tumor cells, etc. Once this encounter takes place, the Nano sponges adhere to the target surface and release the drug contained in them in a controlled and predictable manner. They're also promising for oral route as they enhance the solubility of poorly water-soluble drugs. These are being currently used in cosmetics, over-the-counter prescription products, skin care and sunscreens.

**PC - 03**

# NANO-COMPOSITES IN DENTISTRY

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## ABSTRACT

Restorations are one of the most commonly performed procedures by dentists all over the world and is also one of the oldest procedures in dentistry. Initially restorations were done using metallic materials such as gold, silver, etc. Later these were replaced by amalgam restorations containing an alloy of silver, tin, copper, zinc along with mercury. The current trend is the tooth colored restoration called as composite restoration. In spite of excellent Aesthetics, these composites posed major problems like polymerization shrinkage and inadequate strength to be used in stress bearing posterior teeth region. This led to the development of nanocomposites. They have nanofillers which impart high tensile strength, modulus of elasticity, fracture toughness, abrasion and wear resistance, better marginal integrity and color stability. Owing to these superior properties, nanocomposites are now being used successfully as the restoration of choice for anterior as well as posterior restorations.

**PC – 04**

# NANOTECHNOLOGY IN CREATING A BRIGHT SMILE

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## ABSTRACT

Dental caries is one of the most commonly reported dental problems. It is a multifactorial disease occurring in both primary and permanent teeth, occurring because of the interaction between acidogenic bacteria such as Streptococcus mutans, and sugar in the presence of saliva and other substrates such as food debris. An important stage in the dynamic recess of caries is when it is reversible such as the enamel caries or incipient lesion. This is possible with the help of remineralizing agents. For the past two decades, fluorides have been the most commonly used remineralizing agents. They form Fluor hydroxyapatite, at the expense of calcium and phosphate and calcium formed during demineralization. However, the new revolution is the advent of nanohydroxyapatite crystals. The nanohydroxyapatite nanocrystals were found to adhere to the pores created by demineralization. These adherent nanocrystals were found to aggregate and grow into micro-clusters and form a uniform apatite layer on the demineralized surface. The surface also revealed the newly formed apatite layer to be completely covering the prismatic and inter-prismatic enamel structures.

**PC – 05**

# NANOTHERNOSTICS – AN OVERVIEW

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## ABSTRACT

Nanotechnology holds a great potential to be explored as a multifunctional platform for a wide range of biological and engineering applications such as molecular sensors for disease diagnosis, therapeutic agents for the treatment of diseases, and a vehicle for delivering therapeutics and imaging agents for theranostic applications in cells and living animals. Nanotheranostics is a burgeoning field in recent years, which makes use of "nanotechnology" for diagnostics and therapy of different diseases. The recent advancement in the area of nanotechnology has enabled a new generation of different types of nanomaterials composed of either inorganic or polymer based nanoparticles to be useful for nanotheranostics applications. Some of the salient features of the nanotechnology towards medicine are cost reduction, reliable detection and diagnosis of diseases at an early stage for optimal treatment. The advent of nanotheranostics is expected to benefit the pharmaceutical and healthcare industries in the next 5-10 years. Recent advances in nanotheranostics have expanded this notion and enabled the characterization of individual tumours, the prediction of nanoparticle–tumour interactions, and the creation of tailor-designed nanomedicines for individualized treatment.

**PC – 06**

# NANOTECHNOLOGY – SAFETY CHALLENGES

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## ABSTRACT

Nanotechnology has its role in every field and it can make our life easy and faster. But it has few limitations relating to our safety concerns. Nanomaterials have large surface area volume ratio due to which atoms present at the surface also increase. Thus, nanomaterials are more reactive and have increased rate of absorption through skin, lungs, and digestive tract. Thus, after a prolonged use, these will get accumulated in different organs and will be transported to the other organs via blood. In the lungs, they may cause inflammation of the alveoli and subsequent cell damage. These small particles can also react with DNA, RNA, and other intracellular components and can cause mutations. Nanotechnology is a relatively newer field, which works in an as yet uncharted territory. As are the benefits not yet completely realized, so are the possible threats and safety concerns. Only prolonged clinical use will determine the true potentials and threats of Nanotechnology in Medicine and Dentistry.

**PC – 07**

# NANO DENTAL MATERIALS

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## ABSTRACT

Various nanomaterials can be used for restoration of decayed, carious, missing, and fractured teeth. Recent advances in nanomaterials have brought nanocomposites, nano impression, and nanoceramic into the domain of clinical dentistry. Composite materials should have two important properties, i.e., strength and esthetics. Both these properties largely depend upon the filler particle size. From the traditional filler particles till micro filled particles, esthetic properties have improved but not so the strength properties. Trying to create a new material having both these properties, namely the mechanical strength and esthetic and polishing qualities, nanofillers have been introduced.20 Nanocomposites have three different filler components namely: non-agglomerated discrete silica nanoparticles, barium glass, and prepolymerized fillers.21 Filtek Ultimate Body and Filtek Ultimate Translucent (nanofilled composites) when compared to GC Gradia Direct Anterior (microfilled) and Filtek Z250 (microhybrid composite) nanofilled composites were found to have superior properties than other more traditional composite resins. Polymethyl methacrylate (PMMA), due to its exclusive advantages such as good optical properties, biocompatibility, easy processing, and reparability, has been used for almost all the removable dental prostheses.

**PC – 08**

# NANOSENSORS

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## ABSTRACT

Nanomaterials-based sensors have several benefits in sensitivity and specificity over sensors made from traditional materials. Nanosensors can have increased specificity because they operate at a similar scale as natural biological processes, allowing functionalization with chemical and biological molecules, with recognition events that cause detectable physical changes. Enhancements in sensitivity stem from the high surface-to-volume ratio of nanomaterials, as well as novel physical properties of nanomaterials that can be used as the basis for detection, including nanophotonic. Nanosensors can also potentially be integrated with nanoelectronics to add native processing capability to the nanosensor. One-dimensional nanomaterials such as nanowires and nanotubes are well suited for use in nanosensors, as compared to bulk or thin-film planar devices. They can function both as transducers and wires to transmit the signal. Their high surface area can cause large signal changes upon binding of an analyte. Their small size can enable extensive multiplexing of individually addressable sensor units in a small device. Their operation is also "label free" in the sense of not requiring fluorescent or radioactive labels on the analytes.

**PC – 09**

# NANO BIOELECTRONICS

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## ABSTRACT

Nano-bioelectronics represents a rapidly expanding interdisciplinary field that combines nanomaterials with biology and electronics and, in so doing, offers the potential to overcome existing challenges in bioelectronics. Shrinking electronic transducer dimensions to the nanoscale and making their properties appear more biological can yield significant improvements in the sensitivity and biocompatibility and thereby open opportunities in fundamental biology and healthcare. This poster emphasizes recent advances in nano-bioelectronics enabled with semiconductor nanostructures, including silicon nanowires, carbon nanotubes, and graphene. First, the synthesis and electrical properties of these nanomaterials are discussed in the context of bioelectronics. Second, affinity-based nano-bioelectronic sensors for highly sensitive analysis of biomolecules are reviewed. In these studies, semiconductor nanostructures as transistor-based biosensors are discussed from fundamental device behavior through sensing applications and future challenges. Third, the complex interface between nanoelectronics and living biological systems, from single cells to live animals, is discussed in the poster.

**PC – 10**

# NANO LIQUID CHROMATOGRAPHY

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## ABSTRACT

Miniaturized separation techniques have emerged as environmentally friendly alternatives to available separation methods. Nano-liquid chromatography (nano-LC), microchip devices and nano-capillary electrophoresis are miniaturized methods that minimize reagent consumption and waste generation. Furthermore, the low levels of analytes, especially in biological samples, promote the search for more highly sensitive techniques; coupled to mass spectrometry, nano-LC has great potential to become an indispensable tool for routine analysis of biomolecules. This short review presents the fundamental aspects of nano-LC analytical instrumentation, discussing practical considerations and the primary differences between miniaturized and conventional instrumentation. Some theoretical aspects are discussed to better explain both the potential and the principal limitations of nano-LC. Recent pharmaceutical and biomedical applications of this separation technique are also presented to indicate the satisfactory performance for complex matrices, especially for proteomic analysis, that is obtained with nano liquid chromatography.

**PC- 11**

# ETHICS IN NANOMEDICINE

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## ABSTRACT

As the science and technology of nanomedicine speed ahead, ethics, policy and the law are struggling to keep up. It is important to proactively address the ethical, social and regulatory aspects of nanomedicine in order to minimize its adverse impacts on the environment and public health and also to avoid a public backlash. At present, the most significant concerns involve risk assessment, risk management of engineered nanomaterials and risk communication. Although in vivo animal experiments and ex vivo laboratory analyses can increase our understanding of the interaction of engineered nanomaterials in biological systems, they cannot eliminate all of the uncertainty surrounding the exposure of a human subject to nanomedicine products in clinical trials. Significant risks can still materialize after a product has cleared the Phase I hurdle and is in Phase II or III clinical trials. Furthermore, as the use of engineered nanomaterials in nanomedicine increases, questions of social justice, access to healthcare and the use of nanotechnology for physical enhancement become increasingly important

**PC -12**

# OCULAR DRUG DELIVERY – A NANOTECHNOLOGY APPROACH

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## ABSTRACT

Nanocarriers, such as nanoparticles, liposomes and dendrimers, are used to enhance ocular drug delivery. Easily administered as eye drops, these systems provide a prolonged residence time at the ocular surface after instillation, thus avoiding the clearance mechanisms of the eye. In combination with a controlled drug delivery, it should be possible to develop ocular formulations that provide therapeutic concentrations for a long period of time at the site of action, thereby reducing the dose administered as well as the instillation frequency. In intraocular drug delivery, the same systems can be used to protect and release the drug in a controlled way, reducing the number of injections required. Another potential advantage is the targeting of the drug to the site of action, leading to a decrease in the dose required and a decrease in side effects

**PC – 13**

# NANOTECHNOLOGY LIQUID POLISH IN DENTISTRY

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## ABSTRACT

Aesthetic requirements are forcing manufacturers and dental professionals to perform more studies with respect to restorative materials and handling techniques. Several changes have been made in the fabrication of dental resin composites to achieve better color stability, greater wear resistance and acceptable surface smoothness of restorations.1 Recently, nanofilled and nano-ceramic resin composite materials have been manufactured and are available as a result of recent developments in nanotechnology. Nanotechnology was first used in dentistry in 1997. It offers the opportunity for designing restorative materials with new characteristics. The advantage of nanotechnology is an increase in the polishing capacity and clinical success of restorative materials by using finer filler particles. Nanofilled resin composite materials are formulated with nanomer and nanocluster filler particles combined with a conventional resin matrix. In 2003, manufacturers combined nanotechnology with methacrylate-modified polysilocxane and the result was nano-ceramic technology.

**PC – 14**

# PROSTHODONTICS AND NANOTECHNOLOGY

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## ABSTRACT

Over the past few decades, inorganic nanoparticles, whose structures exhibit significantly novel and improved physical, chemical, and biological properties, phenomena, and functionality due to their nanoscale size, have elicited much interest. Nanophasic and nanostructured materials are attracting a great deal of attention because of their potential for achieving specific processes and selectivity, especially in biological and pharmaceutical application. Recent studies have demonstrated that specifically formulated metal oxide nanoparticles have good antimicrobial activity or mechanical strength. Among inorganic antimicrobial agents, silver has been employed most extensively since ancient times to fight infections and control spoilage. The use of such nanoparticles has become very popular in the design and development of many dental materials so as to improve their chemical, physical and mechanical properties. The purpose of this article is to review the various nanoparticles used in the manufacturing of acrylic resin, tissue conditioner, dental adhesives, dental composites, dental cements, dental porcelain, implants and maxillofacial prosthesis. The effects of nanoparticles on patient, dental staff and dental technician.

**PC – 15**

# HALLMARKS OF CANCER: THE NEXT GENERATION

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## ABSTRACT

The hallmarks of cancer comprise six biological capabilities acquired during the multistep development of human tumors. The hallmarks constitute an organizing principle for rationalizing the complexities of neoplastic disease. They include sustaining proliferative signaling, evading growth suppressors, resisting cell death, enabling replicative immortality, inducing angiogenesis, and activating invasion and metastasis. Underlying these hallmarks are genome instability, which generates the genetic diversity that expedites their acquisition, and inflammation, which fosters multiple hallmark functions. Conceptual progress in the last decade has added two emerging hallmarks of potential generality to this list-reprogramming of energy metabolism and evading immune destruction. In addition to cancer cells, tumors exhibit another dimension of complexity: they contain a repertoire of recruited, ostensibly normal cells that contribute to the acquisition of hallmark traits by creating the "tumor microenvironment." Recognition of the widespread applicability of these concepts will increasingly affect the development of new means to treat human cancer.

**PC – 16**

# NANO MEDICINES IN CANCER THERAPY

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## ABSTRACT

Nanoparticulate drug delivery has become an area of extensive research as these systems enable bioavailability improvement of poorly water-soluble compounds as well as targeted delivery of active pharmaceutical ingredients to various tissues and organs. Generally, nanoparticles in drug delivery are needed as submicron colloidal particles ranging from 10 to 1000 nm3. US Patent and Trademark, however, nanotechnology using a scale from only 1 to 100 nm and slightly larger. Targeted drug delivery to solid tumors would allow achieving optimum therapeutic outcomes minimizing at the same time adverse effects related to the chemotherapeutic drug; because of this, it is currently asked to develop innovative dosage forms that can either passively or actively target cancerous cells. Nano pharmaceutics with most of the required features that an appropriate targeted drug delivery system should present; additionally, and because of their mean size, nanoparticles have demonstrated to increase cellular uptake and interaction with biological tissues.

**PC – 17**

# CURRENT STATUS OF NANOMEDICINE AND MEDICAL NANOROBOTICS

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## ABSTRACT

Nanomedicine is the process of diagnosing, treating, and preventing disease and traumatic injury, of relieving pain, and of preserving and improving human health, using molecular tools and molecular knowledge of the human body. In the relatively near term, nanomedicine can address many important medical problems by using nanoscale-structured materials and simple nanodevices that can be manufactured today, including the interaction of nanostructured materials with biological systems. In the mid-term, biotechnology will make possible even more remarkable advances in molecular medicine, including microbiological biorobots or engineered organisms. In the longer term, perhaps 10–20 years from today, the earliest molecular machine systems and nanorobots may join the medical armamentarium, finally giving physicians the most potent tools imaginable to conquer human disease, ill-health, and aging.

**PC – 18**

# CLINICAL APPLICATIONS OF NANOMEDICINES

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## ABSTRACT

Molecular nanotechnology has been defined as the three-dimensional positional control of molecular structure to create materials and devices to molecular precision. The human body is comprised of molecules; hence the availability of molecular nanotechnology will permit dramatic progress in human medical services. More than just an extension of "molecular medicine," nanomedicine will employ molecular machine systems to address medical problems, and will use molecular knowledge to maintain and improve human health at the molecular scale. Nanomedicine is the preservation and improvement of human health using molecular tools and molecular knowledge of the human body. Nanomedicines are an emerging group of therapeutics that take advantage of our understanding of phenomena on the nanometer scale. Nanomedicines research requires expertise in a range of diverse fields and thus requires multidisciplinary teams. This article presents a brief review of Nanomedicines with an emphasis on its various aspects associated i.e. introduction, definition, medical and clinical uses, especially role of nanomedicines in treatment of dreadful disease like cancer in current scenario. The article also reveals the concept of nanorobots as well as implications for nanotoxicology from nanomedicines.

**PC – 19**

# NANO FIBERS IN WOUND HEALING

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## ABSTRACT

Nanofiber layers produced from biopolymers (chitosan, gelatin, collagen, polykaprolakton, etc., or combinations of these materials) can be used as a wound dressing for significant support of the wound healing process. Based on results realized from in vitro and in vivo experiments, nanofiber materials have shown significant benefits. When using nanofiber material on contaminated wounds, it is possible to add antibacterial material and drugs to the nanofiber structure. Granulation and re-epithelialization of new dermal tissue can be enhanced by adding growth factor, and adding other materials which support proliferation of dermal tissue, the wound can be covered by a single nanofiber layer or it is possible to incorporate a nanofiber layer onto other carriers and cover the wound with this composite material.

**PC – 20**

# NANOPARTICLES IN TISSUE ENGINEERING

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## ABSTRACT

Nanofiber materials made from biopolymers (collagen, polylactic acid, polycaprolactone, etc.) are possible substrates for growing cells. With the appropriate mechanical and structural properties of the nanofiber material, it is possible to prepare scaffolds which are suitable for implanting by different types of cells. Nanofiber substrates effectively support cell proliferation and enable tissue replacement prepared from a patient´s cells. During the preparation of nanofiber scaffolds, it is possible to incorporate different bioactive materials, for example, growth factor, and eventually other drugs such as an immunosuppressant.

**PC – 21**

# NANOFIBERS AND THEIR APPLICATIONS IN TISSUE ENGINEERING

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## ABSTRACT

Developing scaffolds that mimic the architecture of tissue at the nanoscale is one of the major challenges in the field of tissue engineering. The development of nanofibers has greatly enhanced the scope for fabricating scaffolds that can potentially meet this challenge. Currently, there are three techniques available for the synthesis of nanofibers: electrospinning, self-assembly, and phase separation. Of these techniques, electrospinning is the most widely studied technique and has also demonstrated the most promising results in terms of tissue engineering applications. The availability of a wide range of natural and synthetic biomaterials has broadened the scope for development of nano-fibrous scaffolds, especially using the electrospinning technique. The three-dimensional synthetic biodegradable scaffolds designed using nanofibers serve as an excellent framework for cell adhesion, proliferation, and differentiation. Therefore, nanofibers, irrespective of their method of synthesis, have been used as scaffolds for musculoskeletal tissue engineering

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# METHODS OF NANO FIBER SYNTHESIS

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## ABSTRACT

Currently, there are three techniques available for the synthesis of nanofibers: electrospinning, self-assembly, and phase separation. Of these, electrospinning is the most widely studied technique and also seems to exhibit the most promising results for tissue engineering applications. Nanofibers synthesized by self-assembly and phase separation have had relatively limited studies that explored their application as scaffolds for tissue engineering. This poster reviews the applications of nanofibers in the tissue engineering field which aids the dentist and other healthcare practitioners.

**PC – 23**

# FUTURE TRENDS AND EMERGING ISSUES FOR NANO DELIVERY SYSTEMS IN ORAL AND OROPHARYNGEAL CANCER

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## ABSTRACT

Oral cancer is a prevalent cancer type on a global scale, whose traditional treatment strategies have several drawbacks that could in the near future be overcome through the development of novel therapeutic and prognostic strategies. Nanotechnology provides an alternative to traditional therapy that leads to enhanced efficiency and less toxicity. Various nanosystems have been developed for the treatment of oral cancer, including polymeric, metallic, and lipid-based formulations that incorporate chemotherapeutics, natural compounds, siRNA, or other molecules. This review summarizes the main benefits of using these nanosystems, in parallel with a particular focus on the issues encountered in medical practice. These novel strategies have provided encouraging results in both in vitro and in vivo studies, but few have entered clinical trials. The use of nanosystems in oral cancer has the potential of becoming a valid therapeutic option for patients suffering from this malignancy, considering that clinical trials have already been completed and others are currently being developed.

**PC – 24**

# CHARACTERIZATION OF CHLORHEXIDINE-LOADED CALCIUM-HYDROXIDE MICROPARTICLES AS A POTENTIAL DENTAL PULP-CAPPING MATERIAL

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## ABSTRACT

This study explores the delivery of novel calcium hydroxide [$Ca(OH)_2$] microparticles loaded with chlorhexidine (CHX) for potential dental therapeutic and preventive applications. Herein, we introduce a new approach for drug-delivery to deep dentin-surfaces in the form of drug-loaded microparticles. Unloaded $Ca(OH)_2$ [$Ca(OH)_2$/Blank] and CHX-loaded/$Ca(OH)_2$ microparticles were fabricated by aqueous chemical-precipitation technique. The synthesized-microparticles were characterized in vitro for determination of surface-morphology, crystalline-features and thermal-properties examined by energy-dispersive X-ray scanning and transmission electron-microscopy (EDX-SEM/TEM), Fourier-transform infrared-spectroscopy (FTIR), X-ray diffraction (XRD), thermogravimetric analysis (TGA) and differential scanning-calorimetry (DSC). Time-related pH changes, initial antibacterial/biofilm-abilities and cytotoxicity of CHX-loaded/$Ca(OH)_2$ microparticles were evaluated. Microparticles were delivered to dentin-surfaces with subsequent SEM examination of treated dentin-substrates. The in vitro and ex vivo CHX-release profiles were characterized. $Ca(OH)_2$/Blank were hexagonal-shaped with highest z-average diameter whereas CHX-inclusion evidenced micro-metric spheres with distinguishable surface "rounded deposits" and a negative-shift in diameter. CHX:Ca $(OH)_2$/50 mg exhibited maximum encapsulation-efficiency with good antibacterial and cytocompatibility properties.

**PC – 25**

# MODULATION OF PHYSICAL PROPERTIES OF POLYVINYLSILOXANE IMPRESSION MATERIALS BY FILLER TYPE COMBINATION

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## ABSTRACT

Polyvinylsiloxanes (PVS), used as dental impression materials, were formulated with the variation of loading combination of six types of fillers including nano-sized fumed silica. The fillers were blended with three types of silicone polymers together with cross-linker and inhibitor in base paste and with plasticizer and platinum catalyst in catalyst paste. By replacing parts of crystalline quartz with other fillers, the setting time became much faster. The test group in which quarter of quartz was replaced with fumed silica showed the most ideal working and setting time for clinical use. There was a negative correlation between pH and setting time ($p < 0.05$). Combining the fumed silica was effective in increasing the viscosity, tensile strength and maximum% strain. Combining the diatomaceous earth reduced the setting time and maximum% strain, and dramatically increased the viscosity and tensile strength. The best modulation of physical properties of PVS material was possible by combining fillers during the formulation.

**PC – 26**

# NANO AND MICROMECHANICAL PROPERTIES OF DENTINE: INVESTIGATION OF DIFFERENCES WITH TOOTH SIDE

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## ABSTRACT

The soft zone in dentine beneath the dentino-enamel junction is thought to play an important role in tooth function, strain distribution and fracture resistance during mastication. Recently reported asymmetry in mechanical properties with tooth side may point at a basic property of tooth function. The aim of our study was to test if this asymmetry was reflected in the nano- and micromechanical properties of dentine. We investigated the mechanical properties of dentine on the buccal and lingual side of nine extracted human teeth using nano- and micro indentation. Properties were analyzed on the natural log scale, using maximum likelihood to estimate the parameters. Two-sided 0.05-level likelihood ratio tests were used to assess the influences of surface (buccal versus lingual) and dentine depth, measured from the DEJ in crown dentine and from the CDJ in root dentine. Results showed the well-known gradual increase in mechanical properties with increasing distance from the DEJ. Coronal dentine showed higher elastic modulus and hardness on the lingual side of teeth for all measurements, while root dentine was harder on the buccal side. Due to the subtlety of these effects and the small number of teeth studied, results failed to reach statistical significance. Results suggest that dentine nano- and micromechanical properties vary with tooth side in agreement with recent literature using macroscopic methods. They also reveal that buccal-lingual ratios of hardness are in opposite directions in crown and root dentine, suggesting compensatory functions.

**PC – 27**

# RESTORATIVE DENTISTRY FOR THE PEDIATRIC PATIENT

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## ABSTRACT

The American Academy of Pediatric Dentistry sponsored the Pediatric Restorative Dentistry Consensus Conference in 2002. This paper will review the consensus statements that were issued as a result of the conference. Since the conference there have been advances in procedures, materials, and techniques that need to be considered in terms of some of the consensus statements. The introduction of the First Dental Home, interim therapeutic restoration and nanotechnology are examples of some of the materials and techniques that are now part of everyday pediatric dentistry. This paper will discuss the updates as it relates to each of the 2002 consensus statements.

**PC – 28**

# SALIVA AS A DIAGNOSTIC FLUID

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## ABSTRACT

Salivary diagnostics is a dynamic and emerging field utilizing nanotechnology and molecular diagnostics to aid in the diagnosis of oral and systemic diseases. In this article the author critically reviews the latest advances using oral biomarkers for disease detection. The use of oral fluids is broadening perspectives in clinical diagnosis, disease monitoring, and decision making for patient care. Important elements determining the future possibilities and challenges in this field are also discussed.

**PC – 29**

# NANOSTRUCTURED SURFACES OF DENTAL IMPLANTS

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## ABSTRACT

The structural and functional fusion of the surface of the dental implant with the surrounding bone (osseointegration) is crucial for the short and long-term outcome of the device. In recent years, the enhancement of bone formation at the bone-implant interface has been achieved through the modulation of osteoblasts adhesion and spreading, induced by structural modifications of the implant surface, particularly at the nanoscale level. In this context, traditional chemical and physical processes find new applications to achieve the best dental implant technology. This review provides an overview of the most common manufacture techniques and the related cells-surface interactions and modulation. A Medline and a hand search were conducted to identify studies concerning nano structuration of implant surface and their related biological interaction. In this paper, we stressed the importance of the modifications on dental implant surfaces at the nanometric level. Nowadays, there is still little evidence of the long-term benefits of nanofeatures, as the promising results achieved in vitro and in animals have still to be confirmed in humans. However, the increasing interest in nanotechnology is undoubted and more research is going to be published in the coming years.

**PC – 30**

# NANOMEDICINE FOR THE TREATMENT OF RETINAL AND OPTIC NERVE DISEASES.

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## ABSTRACT

The earliest impact of nanomedicine in ophthalmology is likely to involve the areas of biopharmaceuticals, implantable materials (e.g. tissue regeneration scaffolds, bio resorbable materials), implantable devices (e.g. glaucoma drainage valves), and diagnostic tools (e.g. intraocular pressure (IOP) monitors). Nanotechnology will bring about the development of regenerative medicine (i.e. replacement and improvement of cells, tissues, and organs) and artificial vision. In this chapter, we review ophthalmic applications of nanotechnology in the following areas: drug and trophic factor therapy for glaucoma, retinal degenerative, and retinal vascular disease; gene therapy for retinal degenerative disease; regenerative medicine, including optogenetic and optic nerve regeneration; and diagnostics (minimally invasive IOP monitoring). Nanotechnology will play an important role in both early-stage and late-stage intervention in the management of blinding diseases.

**PC – 31**

# NANOTECHNOLOGY AND ITS ROLE IN CARIES THERAPY

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## ABSTRACT

The purpose of this review is to highlight recent nanotechnological developments for remineralization of incipient caries lesions as well as biomimetic strategies for enamel synthesis based on the application of nanotechnology. Analysis of in vitro data indicates that apatite nanoparticles might be effective in reversing lesion progression in the outer but not in the deeper part of early caries lesions. To control caries-induced demineralization, investigators have developed calcium and phosphate or fluoride ion-releasing nanofillers, enabling resin composites to release ions, if the pH decreases under in vitro conditions. Extensive in vitro investigations of apatite crystallization have been performed to mimic the hierarchical topology of natural enamel. Strategies for formation of highly organized biomineralized structures include oriented aggregation of nano crystallites or the assembly of apatite nanoparticles mediated by organic scaffolds. Despite all these promising in vitro experiments, the effectiveness of such strategies for the control of demineralization processes as well as for caries therapy still needs validation by clinical studies.

**PC – 32**

# TISSUE ENGINEERED PERIODONTAL PRODUCTS

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## ABSTRACT

Attainment of periodontal regeneration is a significant clinical goal in the management of advanced periodontal defects arising from periodontitis. Over the past 30 years numerous techniques and materials have been introduced and evaluated clinically and have included guided tissue regeneration, bone grafting materials, growth and other biological factors and gene therapy. Except for gene therapy, all have undergone evaluation in humans. All the products have shown efficacy in promoting periodontal regeneration in animal models but the results in humans remain variable and equivocal concerning attaining complete biological regeneration of damaged periodontal structures. In the early 2000s, the concept of tissue engineering was proposed as a new paradigm for periodontal regeneration based on molecular and cell biology. Currently, tissue engineering was a new and emerging field. Now, 14 years later we revisit the concept of tissue engineering for the periodontium and assess how far we have come, where we are currently situated and what needs to be done in the future to make this concept a reality. In this review, we cover some of the precursor products, which led to our current position in periodontal tissue engineering. The basic concepts of tissue engineering with special emphasis on periodontal tissue engineering products is discussed including the use of mesenchymal stem cells in bio scaffolds and the emerging field of cell sheet technology. Finally, we consider the future to consider what CAD/CAM technology and nanotechnology will have to offer.

**PC – 33**

# NON-CONVENTIONAL THERAPEUTICS FOR ORAL INFECTIONS

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## ABSTRACT

As our knowledge of host-microbial interactions within the oral cavity increases, future treatments are likely to be more targeted. For example, efforts to target a single species or key virulence factors that they produce, while maintaining the natural balance of the resident oral microbiota that acts to modulate the host immune response would be an advantage. Targeted approaches may be directed at the black-pigmented anaerobes, Porphyromonas gingivalis and Prevotella intermedia, associated with periodontitis. Such pigments provide an opportunity for targeted phototherapy with high-intensity monochromatic light. Functional inhibition approaches, including the use of enzyme inhibitors, are also being explored to control periodontitis. More general disruption of dental plaque using enzymes and detergents, alone and in combination, shows much promise. The use of probiotics and prebiotics to improve gastrointestinal health has now led to an interest in using these approaches to control oral disease. More recently the potential of antimicrobial peptides and nanotechnology, through the application of nanoparticles with biocidal, anti-adhesive and delivery capabilities, has been explored. The aim of this review is to consider the status as regards non-conventional treatment approaches for oral infections with particular emphasis on the plaque-related diseases.

**PC – 34**

# NANOSTRUCTURED CERAMICS FOR BIOMEDICAL IMPLANTS

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## ABSTRACT

Recent progress in the synthesis, characterization, and biological compatibility of nanostructured ceramics for biomedical implants is reviewed. A major goal is to develop ceramic coating technology that can reduce the friction and wear in mating total joint replacement components, thus contributing to their significantly improved function and longer life span. Particular attention is focused on the enhancement of mechanical properties such as hardness, toughness, and friction coefficient and on the bioactivity as they pertain to the nanostructure of the material. The development of three nanostructured implant coatings is discussed: diamond, hydroxyapatite, and functionally graded metalloceramics based on the Cr-Ti-N ternary system. Nanostructured diamond produced by chemical vapor deposition (CVD) techniques and composed of nano-size diamond grains have particular promise because of the combination of ultrahigh hardness, improved toughness over conventional microcrystalline diamond, low friction, and good adhesion to titanium alloys. Nanostructured processing applied to hydroxyapatite coatings is used to achieve the desired mechanical characteristics and enhanced surface reactivity and has been found to increase osteoblast adhesion, proliferation, and mineralization. Finally, nanostructured metalloceramic coatings provide continuous variation from a nanocrystalline metallic bond at the interface to the hard-ceramic bond on the surface and have the ability to overcome adhesion problems associated with ceramic hard coatings on metallic substrates.

**PC – 35**

# NANOSTRUCTURED BIOCERAMICS FOR MAXILLOFACIAL APPLICATIONS

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## ABSTRACT

Biomaterials science and technology have been expanding tremendously the recent years. The results of this evolution are obvious in maxillofacial applications especially with the contemporary development of Nanotechnology. Among biomaterials, bioceramics possess a specific field due to various interactions with the biological tissues. The combination of bioceramics and nanotechnology has resulted in enhanced skeletal interactions in maxillofacial applications. Nanotechnology secures better mechanical properties and more effective biological interactions with jaws. The main production methods for the synthesis of nanostructured materials include plasma arcing, chemical vapour deposition, sol-gel and precipitation. The bioceramics in Dentistry comprise inert, bioactive, resorbable and composite systems. The purpose of the present article is to describe the available nanotechnology methods and how these could be addressed to synthesize maxillofacial bioceramics with advanced properties for better biological applications. Additionally, it describes specific clinical applications in maxillofacial surgery of these biomaterials--either by themselves or in combination with others--that can be promising candidates for bone tissue engineering. Such applications include replacement of lost teeth, filling of jaws defects or reconstruction of mandible and temporomandibular joint.

**PC – 36**

# USE OF QUANTUM DOTS IN THE DEVELOPMENT OF ASSAYS FOR CANCER BIOMARKERS

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## ABSTRACT

Biomarker assays may be useful for screening and diagnosis of cancer if a set of molecular markers can be quantified and statistically differentiated between cancerous cells and healthy cells. Markers of disease are often present at very low concentrations, so methods capable of low detection limits are required. Quantum dots (QDs) are nanoparticles that are emerging as promising probes for ultrasensitive detection of cancer biomarkers. QDs attached to antibodies, aptamers, oligonucleotides, or peptides can be used to target cancer markers. Their fluorescent properties have enabled QDs to be used as labels for in-vitro assays to quantify biomarkers, and they have been investigated as in-vivo imaging agents. QDs can be used as donors in assays involving fluorescence resonance energy transfer (FRET), or as acceptors in bioluminescence resonance energy transfer (BRET). The nanoparticles are also capable of electrochemical detection and are potentially useful for "lab-on-a-chip" applications. Recent developments in silicon QDs, non-blinking QDs, and QDs with reduced-size and controlled-valence further make these QDs bioanalytically attractive because of their low toxicity, biocompatibility, high quantum yields, and diverse surface modification flexibility. The potential of multiplexed sensing using QDs with different wavelengths of emission is promising for simultaneous detection of multiple biomarkers of disease

**PC – 37**

# THE INNOVATIVE APPLICATIONS OF THERAPEUTIC NANOSTRUCTURES IN DENTISTRY

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## ABSTRACT

Nanotechnology has paved multiple ways in preventing, reversing or restoring dental caries which is one of the major health care problems. Nanotechnology aided in processing variety of nanomaterials with innovative dental applications. Some showed antimicrobial effect helping in the preventive stage. Others have remineralizing potential intercepting early lesion progression as Nano sized calcium phosphate, carbonate hydroxyapatite nanocrystals, nano amorphous calcium phosphate and nanoparticulate bioactive glass particularly with provision of self-assembles protein that furnish essential role in biomimetic repair. The unique size of nanomaterials makes them fascinating carriers for dental products. Thus, it is recently claimed that fortifying the adhesives with nanomaterials that possess biological merits does not only enhance the mechanical and physical properties of the adhesives, but also help to attain and maintain a durable adhesive joint and enhanced longevity. Accordingly, this review will focus on the current status and the future implications of nanotechnology in preventive and adhesive dentistry.

**PC – 38**

# MECHANICAL CHARACTERIZATION OF NANOFIBERS

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## ABSTRACT

Nanofibers made from various materials such as polymers, carbon and semiconductors have been used for a wide range of applications such as tissue engineering, filter media, reinforcement in nanocomposites and micro/nano-electro-mechanical systems. In most of these applications, the nanofibers are subjected to stresses and strains from the surrounding media during their service lifetime. Such stresses can cause permanent deformation or even failure to the nanofibers. Therefore, there is a need to characterize the mechanical properties of single nanofibers. The aim of this paper is to provide a review of experimental techniques for the mechanical characterization of nanofibers, namely tensile test, bend test and indentation done at the nanoscale.

**PC – 39**

# SILK FIBROIN NANOFIBER ELECTROSPINNING PROPERTIES AND STRUCTURE

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## ABSTRACT

An electrospinning process was used to fabricate silk fibroin (SF) nanofiber nonwovens for wound dressing applications. The electrospinning of regenerated SF was performed with formic acid as a spinning solvent. For crystallization, as-spun SF nanofiber nonwovens were chemically treated with an aqueous methanol solution of 50%. The morphology, porosity and conformational structures of as-spun and chemically treated SF nanofibers were investigated by scanning electron microscopy (SEM), mercury porosimetry, wide angle X-Ray diffraction (WAXD), attenuated total reflectance infrared spectroscopy (ATR-IR), solid state 13C CP/MAS nuclear magnetic resonance (NMR) spectroscopy. SEM micrograph showed that the electro spun SF nanofibers had an average diameter of 80 nm and a distribution in diameter ranging from 30 to 120 nm. The porosity of as-spun SF nanofiber nonwovens was 76.1%, indicating it was highly porous. Conformational transitions of the as-spun SF nanofibers from random coil to β-sheet by aqueous methanol treatment occurred rapidly within 10 min, confirmed by solid-state 13C NMR, ATR-IR, and X-Ray diffraction.

**PC – 40**

# ELECTROSPINNING AND MECHANICAL CHARACTERIZATION OF GELATIN NANOFIBERS

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## ABSTRACT

This paper investigates electrospinning of a natural biopolymer, gelatin, and the mass concentration-mechanical property relationship of the resulting nanofiber membranes. It has been recognized that although gelatin can be easily dissolved in water the gelatin/water solution was unable to electro spin into ultra-fine fibers. A different organic solvent, 2,2,2-trifluoroethanol, is proven suitable for gelatin, and the resulting solution with a mass concentration in between 5 and 12.5% can be successfully electro spun into nanofibers of a diameter in a range from 100 to 340 nm. Further lower or higher mass concentration was inapplicable in electrospinning at ambient conditions. We have found in this study that the highest mechanical behavior did not occur to the nano-fibrous membrane electro spun from the lowest or the highest mass concentration solution. Instead, the nanofiber mat that had the finest fiber structure and no beads on surface obtained from the 7.5% mass concentration exhibited the largest tensile modulus and ultimate tensile strength, which are respectively 40 and 60% greater than those produced from the remaining mass concentration, i.e. 5, 10, and 12.5%, solutions.

**PC – 41**

# BIOMEDICAL APPLICATIONS OF NANOFIBERS

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## ABSTRACT

Nanofiber technology is an exciting area attracting the attention of many researchers as a potential solution to the current challenges in the biomedical field such as burn and wound care, organ repair, and treatment for osteoporosis and various diseases. Nanofibers are attractive in this field for several reasons. First, surface area on nanofibers is much higher compared to bulk materials, which allows for enhanced adhesion of cells, proteins, and drugs. Second, nanofibers can be fabricated into sophisticated macro-scale structures. The ability to fabricate nanofibers allows renewed efforts in developing hierarchical structures that mimic those in animals and human. On top of that, a wide range of polymers can be fabricated into nanofibers to suit different applications. Nanofibers are most commonly fabricated through electrospinning, which is a low-cost method that allows control over fiber morphology and is capable of being scaled-up for mass production. This review explored two popular areas of biomedical nanofiber development: tissue regeneration and drug delivery, and included discussions on the basic principles for how nanofibers promote tissue regeneration and drug delivery, the parameters that affect nanofiber performance and the recent progress in these areas.

**PC – 42**

# NANOMEDICINE: PROMISING TINY MACHINE FOR THE HEALTHCARE IN FUTURE

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## ABSTRACT

One of the 21st century's most promising technologies is nanotechnology. Nanomedicine, an offshoot of nanotechnology, refers to highly specific medical intervention at the molecular scale for curing disease or repairing damaged tissues, such as bone, muscle, or nerve. Nanotechnology is a collective term referring to technological developments on the nanometer scale, usually 0.1-100 nm. A nanometer is one-billionth of a meter, too small to be seen with a conventional laboratory microscope. It is at this size scale - about 100 nanometers or less - that biological molecules and structures inside living cells operate. Therefore, nanotechnology is engineering and manufacturing at the molecular scale. Utilities of nanotechnology to biomedical sciences imply creation of materials and devices designed to interact with the body at sub-cellular scales with a high degree of specificity. This could be potentially translated into targeted cellular and tissue-specific clinical applications aimed at maximal therapeutic effects with very limited adverse-effects. Nanomedicine can offer impressive resolutions for various life-threatening diseases. Disease areas which can be expected to benefit most from nanotechnology within the next few years are cancer, diseases of the cardiovascular system, the lungs, blood, neurological (especially neurodegenerative) diseases, diabetes, inflammatory/infectious diseases, Parkinson's or Alzheimer's disease and orthopedic problems. In the first half of the 21$^{st}$ century, nanomedicine should eliminate virtually all common diseases of the 20th century.

**PC – 43**

# PERSONALIZED NANOMEDICINE

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## ABSTRACT

Personalized medicine aims to individualize chemotherapeutic interventions on the basis of ex vivo and in vivo information on patient- and disease-specific characteristics. By noninvasively visualizing how well image-guided nanomedicines-that is, sub micrometer-sized drug delivery systems containing both drugs and imaging agents within a single formulation of drug, and designed to more specifically deliver drug molecules to pathologic sites-accumulate at the target site, patients likely to respond to nanomedicine-based therapeutic interventions may be preselected. In addition, by longitudinally monitoring how well patients respond to nanomedicine-based therapeutic interventions, drug doses and treatment protocols can be individualized and optimized during follow-up. Furthermore, noninvasive imaging information on the accumulation of nanomedicine formulations in potentially endangered healthy tissues may be used to exclude patients from further treatment. Consequently, combining noninvasive imaging with tumor-targeted drug delivery seems to hold significant potential for personalizing nanomedicine-based chemotherapy interventions, to achieve delivery of the right drug to the right location in the right patient at the right time.

**PC – 44**

# NANOPARTICLES FOR DRUG DELIVERY

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## ABSTRACT

Nanoparticle technology was recently shown to hold great promise for drug delivery applications in nanomedicine due to its beneficial properties, such as better encapsulation, bioavailability, control release, and lower toxic effect. Despite the great progress in nanomedicine, there remain many limitations for clinical applications on nanocarriers. Synthesizing nanoparticles for pharmaceutical purposes such as drug preparation can be done in two methods. Bottom up process such as pyrolysis, inert gas condensation, solvothermal reaction, sol-gel fabrication and structured media in which hydrophobic compound such as liposomes are used as bases to mount the drug. Top down process such as attrition / milling in which the drug is chiseled down to form a nanoparticle. To overcome these limitations, advanced nanoparticles for drug delivery have been developed to enable the spatially and temporally controlled release of drugs in response to specific stimuli at disease sites. Furthermore, the controlled self-assembly of organic and inorganic materials may enable their use in theranostic applications. This review presents an overview of a recent advanced nanoparticulate system that can be used as a potential drug delivery carrier and focuses on the potential applications of nanoparticles in various biomedical fields for human health care. A novel process for synthesis of polymeric nanoparticles for use in drug delivery applications using the electro spraying technique. The technologies standardized for synthesis of natural polymer based nanoparticles such as chitosan-gelatin based nanoparticles.

**PC – 45**

# BACTERICIDES EFFECT OF SILVER NANO PARTICLES

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## ABSTRACT

The bactericidal effect of silver ions on micro-organisms is very well known; however, the bactericidal mechanism is only partially understood. It has been proposed that ionic silver strongly interacts with thiol groups of vital enzymes and inactivates them. Experimental evidence suggests that DNA loses its replication ability once the bacteria have been treated with silver ions. Other studies have shown evidence of structural changes in the cell membrane as well as the formation of small electron-dense granules formed by silver and sulfur. Silver ions have been demonstrated to be useful and effective in bactericidal applications, but due to the unique properties of nanoparticles nanotechnology presents a reasonable alternative for development of new bactericides.

**PC – 46**

# NANO PIGMENTED POLYMETHYL METHACRYLATE DENTURE BASE

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## ABSTRACT

Fractures in poly(methyl methacrylate) (PMMA) dentures occur mainly after 3 years in service, since several factors can induce the denture bases failure, such as occlusal disharmonies, overload, repeated chewing stress, handling, and mechanical impacts caused by accidents and so on. In spite of the current developments in polymer technology, PMMA is still used in 95 % of thermos polymerized acrylic res- ins for denture bases, because of its color, durability, solubility, and biocompatibility properties. Then, it is important to enhance the flexural behavior of denture base resins for instance, incorporating reinforcing fibers during the processing of dentures.

**PC – 47**

# VIRAL NANO PARTICLES IN MEDICINE

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## ABSTRACT

Several nanoparticle platforms are currently being developed for applications in medicine, including both synthetic materials and naturally occurring bionanomaterials such as viral nanoparticles (VNPs) and their genome-free counterparts, virus-like particles (VLPs). A broad range of genetic and chemical engineering methods have been established that allow VNP/VLP formulations to carry large payloads of imaging reagents or drugs. Furthermore, targeted VNPs and VLPs can be generated by including peptide ligands on the particle surface. In this article, we highlight state-of-the-art virus engineering principles and discuss recent advances that bring potential biomedical applications a step closer. Viral nanotechnology has now come of age and it will not be long before these formulations assume a prominent role in the clinic.

**PC – 48**

# NANO POLYMER THERAPEUTICS

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## ABSTRACT

Polymer therapeutics encompass polymer–protein conjugates, drug–polymer conjugates, and supramolecular drug-delivery systems. Numerous polymer–protein conjugates with improved stability and pharmacokinetic properties have been developed, for example, by anchoring enzymes or biologically relevant proteins to polyethylene glycol components (PEGylation). Several polymers–protein conjugates have received market approval, for example the PEGylated form of adenosine deaminase. Coupling low-molecular-weight anticancer drugs to high-molecular-weight polymers through a cleavable linker is an effective method for improving the therapeutic index of clinically established agents, and the first candidates have been evaluated in clinical trials, including, N-(2-hydroxypropyl) methacrylamide conjugates of doxorubicin, camptothecin, paclitaxel, and platinum(II) complexes. Another class of polymer therapeutics are drug-delivery systems based on well-defined multivalent and dendritic polymers. These include polyanionic polymers for the inhibition of virus attachment, polycationic complexes with DNA or RNA (polyplexes), and dendritic core–shell architectures for the encapsulation of drugs.

**PC – 49**

# BACTERIAL NANO CELLULOSE AND ITS APPLICATIONS

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## ABSTRACT

Nanocellulose, such as that produced by the bacteria Gluconacetobacter xylinus (bacterial cellulose, BC), is an emerging biomaterial with great potential as a biological implant, wound and burn dressing material, and scaffolds for tissue regeneration. BC has remarkable mechanical properties even though it contains up to 99% water. The water-holding ability is the most probable reason why BC implants do not elicit any foreign body reaction. Moreover, the nanostructure and morphological similarities with collagen make BC attractive for cell immobilization and cell support. The architecture of BC materials can be engineered over length scales ranging from nano to macro by controlling the bio fabrication process. This article describes current and future applications of BC in the biomedical field.

**PC – 50**

# THE EFFECT OF NANOTECHNOLOGY ON DRUG DELIVERY

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## ABSTRACT

Nanotechnology is the engineering and manufacturing of materials at the atomic and molecular scale. In its strictest definition from the National Nanotechnology Initiative, nanotechnology refers to structures roughly in the 1−100 nm size regime in at least one dimension. Despite this size restriction, nanotechnology commonly refers to structures that are up to several hundred nanometers in size and that are developed by top-down or bottom-up engineering of individual components. Herein, we focus on the application of nanotechnology to drug delivery and highlight several areas of opportunity where current and emerging nanotechnologies could enable entirely novel classes of therapeutics

**PC-51**

# EXPLORE THE NATURE "NANO HERBAL MEDICINE"

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## ABSTRACT

Nanotechnology is expected to be the basis of many main technological innovations in the 21st century. Bio-Nanotechnology combines biological principles with physical and chemical approaches to produce nano-sized particles with specific functions. Green synthesis involves the use of microorganisms, plants extracts, and non-toxic chemicals which provides a safer and effective way to produce nanoparticles. Green synthesis of nanoparticle is a cost effective and eco-friendly process in which not any hazardous material is produced. Biological approaches using plants or plant extracts for metal nano particle synthesis have been suggested as valuable alternatives to chemical methods. The use of plant materials for the synthesis of nano particles could be more advantageous, because it does not require elaborate processes. Recent research reported that silver nanoparticles have been synthesized using various natural products like green tea (Camellia sinensis), neem (Azadirachta indica), Aloe vera plant extract, Pomogranate peel extract, latex of Jatropha curcas, etc. The increasing application of nanoparticles in daily life can be fulfilled by this green path which is economic and not a hazardous process. Now days, there are several effective application of AgNPS can increase the production of nanoparticles by green chemistry. Biosynthesis of nano particles by plant extracts is currently under exploitation. Natural Nano medicine can find immense application in the field of biomedical appliances and formulation of antimicrobial agents and in combination with antibiotics.

**PC -52**

# CURCUMIN NANO-BULLET: A BOON TO HERBAL NUTRACEUTICALS

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## ABSTRACT

From ancient era products obtained from medicinal plants have been proved to defend human race from numerous disorders. The golden spice extensively used in India Curcumin is a polyphenol derived from the ancient perennial herb Curcuma Longa Linn also called as turmeric has been shown to exhibit anti-bacterial, anti-fungal, anti-viral, anti-allergic, anti-parasitic, anti-inflammatory, hepatoprotective, and antioxidant properties. In recent times, curcumin has been shown to possess anti-neoplastic effects against various types of cancers which is considered the deadliest threat to human health. Although curcumin is a distinguished nutraceutical, most of the pre-clinical studies warns us of its major disadvantage of being low water soluble and showing poor oral bioavailability thus minimizing its maximum utility. An eyeopener and a boon to this issue is the discovery of the nano-bullet the recently known nanocurcumin analogues which demonstrates very good shielding effects without the limitation of being unstable and poorly bioavailable. This review will deepen our knowledge on the several nano preparations of the herbal nutraceutical curcumin and its utmost promising protective effects against variety of health conditions.

**PC-53**

# NANOFORMULATION OF POLYPHENOLS

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## ABSTRACT

Herbal medicines have been used from years throughout the world; especially in India, herbal medicines are in high demand. Use of nanotechnology in herbal medicine and more specifically in drug delivery has a potential future for enhancing the activity and overcoming the problems associated by medicinal plants. The herbal nanocarriers help to treat the diseases like cancer, Diabetes, etc. Polyphenols represent a large and diverse group of substances abundantly present in a majority of fruits, vegetables and herbs. Polyphenols have several beneficial biological activities giving rise to prophylaxis or possibly even to a cure for several prevailing human diseases, especially various types of cancer. Nano formulation of polyphenols will prevent their degradation, enables to reach the target cells and enhances bioavailability. Thus, Herbal Nano formulation of polyphenol will result in lowering of the required therapeutic dose and in multitargeted action.

**PC – 54**

# NANOTECHNOLOGY – AN OPTIMISM IN HEPATOCELLULAR CARCINOMA TREATMENT

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## ABSTRACT

Hepatocellular Carcinoma (HCC) also called malignant hepatoma is considered as one of the world's deadliest sixth most common cancers accounting for the third important cause of cancer related deaths due to its complex, metastatic, recurrence on surgical interventions and poor prognosis. Despite surveillance in high risk groups such as Hepatitis B, Cirrhosis, alcoholic, Non-alcoholic fatty liver diseases and obese patients, most HCC are diagnosed at later stages resulting in a vulnerably less than 17% survival rate. Management of HCC includes both curative and palliative therapy modalities such as Trans arterial chemoembolization (TACE), radiotherapy, chemotherapy and in severe cases surgery and liver transplant. Nexavar (Sorafenib) stands as the only FDA approved expensive candidate for the treatment of HCC but possess an alarmingly amplified amount of toxicity. Since its invention there was no other second line drug which could treat HCC. As an optimistic treatment approach to HCC, use of nanoparticles, liposomes, micelles, proteins and nucleic acids have gained pronounced consideration. This review highlights on the nano drug delivery systems such as miRNA tagged dendrimers, Arabic gum bound gold particles, LDL-DHA complex, copper oxide and superparamagnetic non-oxides which might rule the future as a milestone in diagnosis and treatment of HCC.

**PC-55**

# WHAT'S IN YOUR TOOTH PASTE – A NANOBUG!!!

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## ABSTRACT

As face is the index of your mind, a shiny smile is an index of your oral and overall health. Research says a poor oral health and hygiene results in oral manifestations periodontitis, stomatitis, xerostomia and gingivitis that may lead to many other serious systemic diseases such as leukemia, diabetes, heart, kidney diseases, pancreatic and oral cancers. Hence, first step in prevention of these dangerous diseases is in maintaining a good oral hygiene. Proper brushing of teeth is the basic and ultimate choice that can help in preventing the root cause of these diseases. Use of dentifrices, toothpaste and flossing of teeth are some of the conventional cleaning techniques. What's new is Nanotechnology and Nano dentistry which may allow nearly perfect oral health by discovering toothpastes containing nano sized calcium carbonates, hydroxyapatite Nano crystals, silver, gold nanoparticles and titanium oxides enabling remineralization, cavity filling, and being bacteriostatic and whitening agent. In near future Nanorobots [dentrifrobots] signaled by Nano computers that when left by the mouthwash or toothpaste on tooth surfaces can even remove calculus effectively without harming 500 species of normal flora contributing to a healthy ecosystem as well elimination of tooth loss and gingival diseases and the beauty is it can be safely deactivated on swallowing. The scope of utilization of these nanorobots in toothpaste and mouthwash can deliver good oral hygiene.

**PC-56**

# NANO DRUG DELIVERY IN ORAL CANCER THERAPY: AN EMERGING AVENUE TO UNVEIL

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## ABSTRACT

Cancer is one of the major causes of death worldwide. Chemotherapy is a major therapeutic approach for the treatment that may be used alone or combined with other forms of therapies. Among all the cancers, oral cancer is the most threatening disease in dentistry. Oral cancer is a common and aggressive cancer that occurs within the oral cavity and is characterized by uncontrolled and uncoordinated growth that has remarkable tendency to spread and undergo metastasis. Nanotherapeutics an expanding area of medicine uses nanotechnological products for curing diseases and repairing damaged tissues is emerging as a class of therapeutics for cancer. Nanoparticles such as solid lipids, polymeric, mesoporous silica, nanoparticulated chemo sensitizers and magnetic nanoparticles show enhanced efficacy, reduced side effects and eliminates use of extent of cytotoxic chemotherapy which is the backbone of oncology treatments, owing to the properties such as more targeted localization in tumors and active cellular uptake, and overcomes lack of selectivity, multidrug resistance and lack of aqueous solubility. Until date targeted drug delivery systems via nanoparticles are expected to be promising micro functional platform in oral cancer. Here we highlight the features of nanoparticle therapeutics that distinguish them from previous anticancer therapies and describe how these features provide the potential for therapeutic effects that are not achievable with other modalities.

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# POWERFUL SILVER NANOWEAPON IN DENTURE BASE ORAL CANDIDIASIS

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## ABSTRACT

''Hygiene is two–thirds of health.'' In normal scenario, people care more about general health leaving behind unnoticed of oral hygiene showing their ignorance, as oral health is the root cause for all major diseases of today. Dentistry plays chief role in maintaining and taking care of public's oral health. Not only in treating dental caries and periodontal diseases, scaling, root planning, root canal treatment, tooth extractions and the multi-faceted specialty restorative dentistry takes care of extensive dental problems to even improve speaking and chewing ability enriching one's appearance and self-confidence. One of the notable issues is use of poorly hygienic denture base in the oral cavity for many years' resulting in oral candidiasis. Oral candidiasis also called oral thrush is caused by the most common oral commensal candida albicans found on mucus membrane of the mouth. Candida albicans is also the commonest pathogenic fungus, which has the ability to form bio films on both inert and biological surfaces, thus adheres to denture base materials, wherein denture detergents are effective only against bacteria but not against Candida. A new avenue in this regard is denture base coated with silver particles, possessing potent antibacterial and anti-fungal activity that provides a permanent protection from Candida infections.

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# BATTLE THE BULGE WITH NANOGOLD

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## ABSTRACT

In the mid of world's modernization an important word which came into existence is "Liposuction" or "lipo" surgery which is used enormously for cosmetic procedures and treating medical conditions like lymphedema, gynecomastia and lipomas. More concern started by the fashion of using liposuction as a challenge to change the body's shape. But typically, lipo does not guarantee for long term weight loss or in treatment of obesity related problems. And dark phase of liposuction is serious complications such as deep vein thrombosis, organ perforation, bleeding and infection. Studies show that death occurs in one per ten thousand cases. Traditional liposuction involves making small incisions and using a cannula and applying negative pressure to suck out fat. This procedure often leaves the patients with soreness, bruising, swelling, pain, nerve compressions, seroma, parasthesis and visible scar. Nano lipo technology a new opportunity in cosmetology employs Gold Nano Rod (AuNR) solution energized by external near-infrared laser exposure to selectively heat adipose tissue while sparing surrounding tissues thus reducing scar and other side effects. Major advantages are requirement of less than 10 minutes of time and removal of amount of fat to nearly double the time than that following the conventional method. Future of cosmetic surgery will really relay on this modern nano lipo technology for sure.

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# NANO MEDICINE - NEVER ENDING OFFER!!!

## DIAMOND - GOLD - SILVER

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**ABSTRACT**

Nanomedicine is the medical utilization of nanotechnology. It includes the therapeutic usage of nanomaterials, nano electronic biosensors, biological machines and biologically active devices. Our e-poster depicts the therapeutic application of DIAMOND, GOLD & SILVER in NANOMEDICINE. Nano diamonds are synthesized in 1962 by detonation and also can be prepared by covalent and noncovalent modification to absorb or graft a variety of functional groups and complex moieties, including proteins and DNA. In "Auro therapy" Gold sodium thiosulphate and Gold sodium thiomalate are used to reduce stiffness and swelling associated with rheumatoid arthritis. Silver nanoparticles (NAg) have been used in a wide range of antimicrobial applications such as wound dressing, implant coatings and others.