Biomaterial Interfaces
Room Hall A-C - Session BI-WeP
Poster Session

BI-WeP1 Locally Addressable Electrochemical Patterning Technology (LAEPT) using Poly(L-lysine)-g-Poly(ethylene glycol), PLL-g-PEG, ***C.S Tang***, Swiss Federal Laboratories for Materials Testing and Research, Switzerland

Protein-resistant polyelectrolyte, poly(L-lysine)-g-poly(ethylene glycol) PLL-g-PEG adsorbs spontaneously onto a substrate with surface contrast constituting of conductive titanium and non-conductive silicon-oxide. An applied potential between -0.4 and +1.7V removes the PLL-g-PEG from titanium but simultaneously, there was insignificant polyelectrolyte loss on the silicon-oxide. X-ray photoelectron spectroscopy confirmed the reduction of PLL-g-PEG on the titanium surface and it also indicated that approximately similar amount of PLL-g-PEG remained on the titanium oxide when low corresponding positive and negative voltages of up to 400mV were applied. At 1.7V, time-of-flight secondary ions mass spectroscopy and fluorescence microscopy distinctly demonstrated the intensity contrast between the retention of PLL-g-PEG on the silicon-oxide and PLL-PEG removal from titanium. It is believed that the native oxide layer of titanium undergoes morphological changes with ascending potential and this affects the adhesion stability of PLL-g-PEG on the titanium oxide surface. Electrochemical impedance spectroscopy monitored the voltage-induced changes in the oxide layer whose measured impedance and resistance were found to decrease dramatically with increasing voltage. Further investigations hinted that diffusional-controlled processes within the oxide caused complex morphological changes, eventuating in an unstable adhesion platform for weak PLL-g-PEG electrostatic binding. The difference in the response of an applied potential on the titanium/silicon region under electrochemical conditions permits the exploitation and regeneration of various immobilization techniques on titanium while maintaining a protein resistant background on the non-conductive region. This reliable method offers prospects in selective electrochemical patterning for the biomedical as well as semiconductor industries. It will be termed here as locally addressable electrochemical patterning technology, LAEPT.

BI-WeP2 Simple Fabrication of Polymer Thin Films with Lithographic Bas-relief Micro-pattern and Self-organized Micro-porous Structure, ***T.A. Ohzono***, *T. Nishikawa, M.A. Shimomura,* RIKEN, Japan

The cost of making micro scale components through conventional lithographic techniques increases depending on the degree of design complexity. Whereas, non-lithographic approaches have also been investigated extensively to reduce or replace the complicated process involved in those lithographic techniques. Therefore, it seems necessary to combine the good aspects of the self-organization process and of the conventional lithography toward the optimum productivity for fabrication of micro scale textures for some practical applications . Adopting such approach, here we show a very simple method for fabrication of a patterned polymer thin film with a hierarchical structure. The structure consists of a bas-relief pattern at tens of microns and the ordered array of pores with diameters of 4-5 μm. The former pattern is originally fabricated through conventional photolithography. The latter emerges from self-organized process, where micrometer-size water droplets condensed on the surface of evaporating solutions are spontaneously arranged. The film is self-supporting. It is possible to control by the polymer concentration whether the film is bottomless, partially bottomless, or not. The bio-compatible polymer of the lactic-acid can be used as the material. The film with the novel structure will enable us to do patterning of functional particles, of cells, and of bio-sensing elements toward new bio-coupled devices.

BI-WeP3 Adsorption Kinetics of Alkanethiol Self-Assembly on Hydrogenated Ge(111), ***M.R. Kosuri***, *R. Cone, Q. Li, S.M. Han,* University of New Mexico*; C.B. Bunker, T.M. Mayer,* Sandia National Laboratories

We have investigated in situ and in real-time the liquid-phase self-assembly of 1-alkanethiols on hydrogenated Ge(111), using attenuated total reflection Fourier transform infrared spectroscopy (ATR-FTIRS). The water contact angle measurements on thiolated Ge demonstrate that the final packing density is a function of both alkanethiol concentration in 2-propanol and the chain length of thiolate molecules. The absolute saturation coverage of 1-hexadecanethiol is approximately 4.2x10@sup 14@ cm@sup -2@ based on the IR absorbance of C-H stretching vibrational modes near 2900 cm@sup -1@. We also report the adsorption rate constant of 0.1 M 1-hexadecanethiol on hydrogenated Ge(111) at room temperature. The rate constant is 2.1 ± 0.6 cm@sup 3@/mol-sec, based on a Langmuir isotherm.

BI-WeP4 Deposition of Lipid DPPC Monolayer on SiO@sub 2@ Surface using OTS Self-assembled Monolayer Islands as Anchor Molecules, ***M. Takizawa***, *Y.H. Kim,* The Graduate University for Advanced Studies, Japan*; T. Urisu,* The Graduate University for Advanced Studies and Institute for Molecular Science, Japan

Bilayer lipid membranes (BLMs) supported on the gold surface are active research target from the viewpoint of application to the biosensors. It is reported that the stability of the membrane can be extended significantly by using the "anchor molecules", i.e. the synthesized thiolipid which is chemically anchored to the gold surface. In this work, we have examined for the first time the deposition of DPPC (dipalmitoyl phoshatidylcholine) monolayer on SiO@sub 2@ surface using OTS (n-octadecyltrichlorosilane) self-assembled monolayer (SAM) islands as anchor molecules. OTS SAMs have been deposited by dipping the Si (111) substrates with thermally oxidized SiO@sub 2@ surface layer into ~10 % toluene solution (containing small amount of water) at a room temperature. After deposition of OTS SAM island, the DPPC monolayer was transferred to the substrates by Langmuir-Brodgett method at the surface pressure of 35 mN/m. The height of the OTS SAM island measured by AFM was ~2 nm, which is consistent with a previous report. The surface morphology measurements by AFM after the DPPC transfer shows that the flat DPPC monolayer is deposited almost completely filling the (hydrophilic) SiO@sub 2@ surface area-selectively. On the (hydrophobic) OTS SAM island surface, on the other hand, DPPC monolayer deposition was not observed. Instead, small lumps of condensed DPPC molecules were observed on the surfaces and the edges of the OTS islands. The surface of the DPPC monolayer on the SiO@sub 2@ area was almost the same height as the OTS island surface. These results indicate that the OTS SAM island has a potential of effective anchor molecules in DPPC BLM depositions on SiO@sub 2@ surfaces.

BI-WeP5 Characterization and Durability of Organosilane Self-assembled Monolayers on the Native Titanium Oxide Surface, ***R.M. Lennen***, *R.A. Brizzolara,* NSWC, Carderock Division

Titanium is a common material of heat exchangers and seawater piping systems on U.S. Naval vessels, as well as a key biomedical implant material. Several different organosiloxane self-assembled monolayers (SAMs) have been prepared on cleaned and hydroxylated titanium surfaces and characterized with x-ray photoelectron spectroscopy (XPS), angle-resolved XPS, and contact angle measurements. Precursors include trichlorosilanes and trialkoxysilanes with a wide array of terminal functional groups. Perfluorinated SAMs and multilayers were tested for their durability in natural filtered seawater from Port Everglades, FL; artificial seawater; artificial seawater inoculated with the biofilm forming bacterium Deleya marina; and flowing seawater at Port Everglades under two flow velocities. The thermal stability of coatings formed from alkyltrialkoxysilane precursors on titanium was also investigated in ultrahigh vacuum. In the future, these self-assembled monolayers will be used to investigate biofilm adhesion as a function of critical surface tension. This will lead to the development of ultra-thin antifouling coatings for shipboard titanium heat exchanger tubes with seawater intake. This work was funded by the NSWC Carderock Division In-House Laboratory Independent Research program and the Office of Naval Research.

BI-WeP6 Amine-Reactive Mixed Monolayers on Scribed Silicon with Controlled Levels of Functionality: The Reaction of Scribed Silicon with Epoxides, ***M.R. Linford***, *Y.-Y. Lua,* Brigham Young University

Epoxides are important in industry and in bioconjugate chemistry because of their reactivity with amines, sulfhydryls, and other nucleophiles. Here we report a significant advance in the preparation of patterned and functionalized silicon surfaces by showing that epoxides readily react with scribed silicon to yield monolayers with even greater efficiency that was reported for 1-alkenes,@footnote 1@ 1-alkynes,@footnote 1@ 1-haloalkanes,@footnote 2@ and alcohols.@footnote 3@ Mixed monolayers were prepared from solutions of 1,2-epoxyoctane and 1,2,7,8-diepoxyoctane to control the number of free epoxide groups at the surface. The amine reactivity of these surfaces increases as the fraction of 1,2,7,8-diepoxyoctane in the monolayers increases. The formation of monolayers occurrs by wetting a dry, oxide-coated or hydrogen-terminated silicon surface with a liquid epoxide or Î±,Ï‰-diepoxide and by scribing in the air with a diamond-tipped instrument or tungsten carbide ball. In addition to this fundamental work, we plan to discuss i) the formation of biotinylated surfaces through a reaction of epoxide surfaces with biocytin (a lysine-

biotin complex) and DNA-containing surfaces (through a reaction with amine-terminated oligonucleotides), and ii) patterning of silicon with these coatings using an AFM tip.@footnote 4@ @FootnoteText@ @footnote 1@ Niederhauser, T.L.; Jiang, G.; Lua, Y.-Y.; Dorff, M.; Woolley, A.T.; Asplund, M.C.; Berges, D.A.; Linford, M.R. Langmuir 2001, 17, 5889-5900.@footnote 2@ Niederhauser, T.L.; Lua, Y.-Y.; Sun, Y.; Jiang, G.; Strossman, G.S.; Pianetta, P.; Linford, M.R. Chemistry of Materials 2002, 14, 27-29.@footnote 3@ Niederhauser, T.L.; Lua, Y.-Y.; Jiang, G.; Davis, S.D.; Matheson, R.; Hess, D.A.; Mowat, I.A.; Linford, M.R. Angew. Chem. Int. Ed. 2002, 41(13), 2353-2356.@footnote 4@ Wacaser, B.A.; Maughan, M.J.; Mowat, I.A.; Niederhauser, T.L.; Linford, M.R.; Davis, R.C. Applied Physics Letters 2003, 82(5), 808-810.

BI-WeP7 Molecular Engineering of Surfaces for Sensing and Detection, *C.L. Boozer, J. Ladd, A. Taylor,* ***Q. Yu****, J. Homola, S. Jiang,* University of Washington

There is an urgent demand for developing sensors capable of quantitative and simultaneous detection, identification, and monitoring of multiple analytes in complex media for various applications ranging from homeland security and medical diagnostics to food and environmental monitoring. Immunological detection with antibodies is perhaps the only technology that has been successfully employed for the detection of bacteria, viruses, proteins, and low-molecular-weight compounds. In this talk, we will discuss our recent effort on molecular engineering of surfaces for sensing and detection. First of all, control of antibody orientation is achieved on charged surface assembled monolayers (SAMs). Antigen is used to probe antibody orientation measured by surface plasmon resonance (SPR) biosensor while direct evidence of preferred antibody orientation is provided by the time-of-flight secondary ion mass spectrometry. Second, it was shown in our previous work that the behavior of protein adsorption depended on nano-scale structures of a surface with which proteins interact. Polyethylene glycol (PEG) SAMs are used as a model surface to study surface resistance to protein adsorption. Atomic force microscopy/scanning tunneling microscopy (AFM/STM), SPR and molecular dynamics simulation techniques are used in such studies. Results show light on molecular-level understanding of non-fouling mechanism. Third, a new DNA-based protein immobilization method has been developed for use with SPR biosensors. This DNA-based immobilization method provides a convenient and versatile for multi-channel biosensors. We will demonstrate the quantitative and simultaneous detection of various analytes ranging from larger-sized to small-molecular weight analytes (e.g., E. coli, SEB, and simazine) in complex matrices (e.g., milk and ground beef) based on this new platform. Finally, we achieved single-molecular detection of immunoreactions using an AFM-based sensor.

BI-WeP9 Multilayers of Functionalized Liposomes for Improved SPR Analysis of Transmembrane Proteins, ***A. Granéli,*** *F. Höök,* Chalmers University of Technology, Sweden

The cell membrane consists of a large fraction of transmembrane proteins, which mediates and performs a large number of reactions taking place in the cell membrane or at the cell membrane surface. All transmembrane proteins consist of a hydrophobic part that transverse the bilayer, which make most of them insoluble in water and therefore difficult to study. Accordingly, functional studies of individual transmembrane proteins generally require dissolving or reconstituting procedures, such as the use of detergents or incorporation in lipid assemblies such as proteoliposomes. In biosensing applications, including drug screening and medical diagnostics, as well as for fundamental studies of transmembrane proteins, surface-based techniques have turned out to be important analytical tools. Application of such techniques require that the proteins are immobilized on a solid surface, which often tends to have a negative influence on the protein activity. The necessity of having the transmembrane proteins residing in lipid membranes complicates immobilization of sufficient amounts of protein. To allow the use of surface analytical tools for studies of transmembrane proteins, protocols that enhance the amount of immobilized protein, thus the signal, are required. For that purpose, we have developed a strategy where multilayers of proteoliposomes are immobilized on Au or SiO@sub 2@ surfaces, proven versatile for studies of ligand-interaction kinetics using the quartz crystal microbalance with dissipation monitoring (QCM-D) and surface plasmon resonance (SPR) techniques. This was achieved by utilizing a DNA-modified surface, to which proteoliposomes modified with complementary DNA was immobilized; a process that was possible to repeat up to at least 6 layers, thus allowing the use of the full sensing depth of QCM-D and SPR. Signal-amplification using the liposome multilayer approach was proven via dissociation or binding from/to the transmembrane protein transhydrogenase.

BI-WeP10 Surface Physico-Chemical Studies of Immobilised Oligonucleotides, ***P-C.T. Nguyen****, S. Kumar,* University of South Australia, Australia*; M. DeNichilo,* TGR BioSciences, Australia*; N. Voelcker,* Flinders University of South Australia, Australia*; H.J. Griesser,* University of South Australia, Australia

Single-stranded oligonucleotides can bind nucleic acid targets as well as other targets such as small molecules, peptides, proteins and cells. Compared to antibodies, the selectivity, specificity and affinity of oligonucleotides are equal and often superior. Thus, surface-immobilised oligonucleotides have become attractive choices as recognition elements in microarrays for high throughput, parallel and multidimensional analysis in biomedical diagnostics, and aptamers are increasingly replacing antibodies as molecular recognition elements. So far, most of the research involving oligonucleotide probes has focussed on end applications for the life sciences, with some work on fundamental aspects of surface immobilisation and target binding to immobilised oligonucleotides. In order to harness the apparent power of such arrays, a more detailed physical and chemical understanding is required, in addition to optimising the immobilisation process. Contributing factors include substrate, oligonucleotide structure, immobilisation chemistry and surface density of immobilised oligonucleotides. Our focus is to characterise and optimise the density of immobilised oligonucleotides, and measure hybridisation efficiency for a specific choice of substrate, oligonucleotide, and immobilisation chemistry. Glass and silicon are the most commonly used substrates but we are extending immobilisation to polymeric carriers. XPS, ToF SIMS and AFM are used to surface characterise the substrate and attached oligonucleotides. Using principles of surface science we study molecular interactions between oligonucleotide chains, and the effects that the structure and packing density of the oligonucleotide coating have on hybridisation, assessed by MALDI-ToF-MS. It is expected that oligonucleotide density will have a direct bearing on activity and steric availability for hybridisation.

BI-WeP11 Characterization of DNA Microarrays, ***D. Barbash****, J.E. Fulghum, Y. Wu, G.P. Lopez,* University of New Mexico

DNA microarrays are widely used for gene expression studies. Production of DNA microarrays includes attachment of single stranded DNA or oligonucleotides onto a variety of different substrata. Methods that are used include directed synthesis of oligonucleotides by photolithography and printing pre-existing cDNA using precision robots. Substrates available for immobilization are gold, modified glasses (aminosilane or polylisine) and filter membranes. There are multiple functional groups in DNA that are capable of attachment the surface to the substrate. The purpose of our study is to reveal the chemistry behind DNA attachment to surfaces. We are using the ATMS(p-aminophenyl trimethoxy silane)/diazotization method to spot oligonucleotides on a microscope glass surface.(Dolan, P.L. et al. Nucleic Acids Research 2001, 29, 21e107). This method include immersion of cleaned microscope glass into the ATMS solution, its activation by NaCl and HCl and spotting DNA onto it. The method results in robust covalent attachment of the DNA in a manner that is compatible with subsequent hybridization.The methods for studying attached nucleotides include X-ray Photoelectron Spectroscopy (XPS) and Attenuated Total Reflection Spectroscopy (ATR-FTIR). XPS allow us characterize the surface composition from less than 10nm depth while ATR-FTIR technique provides chemical information from up to 1mm of the surface.

BI-WeP12 DNA-Based Protein Immobilization vs. Biotin/Streptavidin Bridges, ***C.L. Boozer****, J. Ladd, Q. Yu, S. Chen,* University of Washington*; J. Homola,* Institute of Radio Engineering and Electronics, Czech Republic*; S. Jiang,* University of Washington

A new DNA-based protein immobilization method has been developed for use with SPR biosensors. This DNA-based immobilization method provides a convenient and versatile alternative to the commonly used biotin/streptavidin platform, with comparable, if not better, sensitivity. This work presents a comparison of these two platforms, focusing on the detection of hCG as a model system. Our results show that the DNA-based method allows for detection of lower hCG concentrations. Extensive control experiments have been performed to check both sensor platforms for non-specific binding and cross reactivity. In addition to the increased sensitivity, the DNA-based protein immobilization offers many other advantages crucial to biosensor development that the biotin/streptavidin platform does not have. While both the biotin/streptavidin complex and the DNA-based approach are robust and highly specific, the DNA based approach is much more versatile.

BI-WeP13 Molecular Simulation of Mixed SAMs Including Thiolated DNAs on Gold (111) Surfaces, ***J.P. Sullivan***, *S. Jiang,* University of Washington

The ability to tether DNAs to a solid support has yielded a variety of practical technologies including DNA microarrays and DNA based biosensors. Yet in spite of the rapid advances of surface tethered DNAs in biotechnological applications, improvements to these technologies are made through a painstaking combinatorial process that suffers from a lack of mechanistic understanding. It has been shown that the hybridization of ssDNA SAMs can be affected by the introduction of a non-DNA terminated thiol as a diluent. Experimentalists in our group, for example, are using oligo-ethylene glycol (OEG) terminated thiols along with thiolated ssDNA to form mixed SAMs on gold (111). Speculation has been unable to yield a predictive tool for which diluent length and density will have the best impact on a given DNA probe. Accordingly, we turned to simulation to provide atomic resolution images of these mixed SAMs, revealing information that could not be intuited. All simulations were carried out in explicit solvent with Na+ to balance charge, and NaCl to control ionic strength. The CHARMM27 all-atom potential force field was used to model the DNAs, while the TIP3P potential was used for water interactions. The OEGs were treated using a SJY force field with demonstrated accuracy for OEG-thiols. We present results for the packing of pure DNA SAMs (both single and double stranded, of varying sequence lengths and compositions, and at different ionic strengths). The pure SAM packing results were then used to set up simulations of DNA SAMs mixed with oligo-ethylene glycol at varying diluent lengths (number of repeat units) and densities, for which results are also reported. These results will be instrumental in developing theory-based methods for selecting diluents and diluent densities. This will reduce or eliminate the trial and error process involved in determining diluent properties for the countless possible DNA probes that do not already have optimized diluents.

BI-WeP14 Vacuum-Based Diagnostics of Aqueous Microenvironments Using Evaporative Micro-Orifice Technique, ***T.M. Valentine***, *J.J. Park, G.W. Rubloff,* University of Maryland

While gas and surface chemical analysis techniques can be applied to aqueous systems (e.g., electrospray mass spectrometry), the high surface/volume ratio of bioMEMS environments places a premium on biochemical characterization directly at or within the microfluidic system. We are exploring the direct sampling of the aqueous microenvironment via a micron-scale evaporative orifice which couples the microfluidic system to vacuum-based chemical analytical tools. Considering a variety of coupling designs, simulations indicate the possibility to observe volatile species (dissolved gases such as O@sub 2@, CO@sub 2@, and VOC's), metabolic activity of microorganisms, and nonvolatile species ejected as a consequence of microfluid dynamics at the sampling orifice. For orifice sizes up to 30 µm, differential pumping by the vacuum system will maintain sufficiently low pressures for operation of the vacuum analysis instruments. Considering the large water background and typical mass spectrometry sensitivity (200 ppb), simulations indicate that signals should be measurable from bacterial CO@sub 2@ and VOC evolution. Given flow rates 1-100nL/min at the orifice, ejection and measurement of nonvolatile organic species (proteins, biopolymers) should be possible at concentrations of biological interest. An experimental testbed has been developed to integrate aqueous environments with appropriate vacuum sensing equipment. Results of testing the experimental setup under various conditions, confirming and calibrating the simulation, and expanding the evaporative-orifice concept to integrate microfluidic devices being developed in parallel will be discussed. This effort was undertaken as a senior thesis project with the assistance of a 2003 AVS Undergraduate Research Award.

BI-WeP15 Effects of Surface Treatment and Curing Conditions on Poly(Dimethylsiloxane) Metallization for Retinal Prosthesis, ***M. Maghribi***, *C. Evans, K.J. Wu, A.J. Nelson,* Lawrence Livermore National Laboratory

Surface properties have a critical impact on the general performance of polymers and elastomers. Surface contamination, such as siloxane surfactants, can alter the surface properties of the material thus affecting the fabrication processes. Inadequately cured poly(dimethylsiloxane) (PDMS) is highly mobile and can cause adhesion failures. In this work we explore how surface treatments and PDMS cure time impacts process development for hybrid retinal implants. For example, oxygen plasma treatment is used to promote wetting of the PDMS surface as well as promoting adhesion. To photolithographically pattern metal traces on PDMS is not a trivial task and fundamental material characteristics must be examined to develop reliable and repeatable fabrication processes. Time of flight secondary ion mass spectrometry (ToF-SIMS) and high resolution X-ray photoemission spectroscopy (XPS) were utilized to reveal the surface chemistry attributed to different surface treatments and curing conditions. ToF SIMS results indicate that the basic molecular and chemical structure of poly(dimethylsiloxane) is altered under O@sub 2@ treatment. Specifically, a strong oxidation reaction to the dimethlysiloxane group occurs, replacing methyl with silanol groups; which is ultimately responsible for the success in metallization. XPS quantitative analysis revealed an oxygen rich surface with significantly increased Si-O bonding. In addition, high-resolution C 1s, O 1s and Si 2p core-level spectra revealed additional C-O and O-Si-O bonding following O@sub 2@ plasma treatment. We conclude from these results that the explanation for the affinity of metals to adhere to the PDMS following O@sub 2@ plasma treatment is due to the reactive Si-O group formed on the surface. This work was performed under the auspices of the U.S. Dept. of Energy by the University of California Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

BI-WeP16 Bioactivity of Titanium Coatings Prepared by Reactive Plasma Spraying, ***M. Inagaki***, *Y. Yokogawa, T. Kameyama,* National Institute of Advanced Industrial Science and Technology (AIST), Japan

A simple treatment method using radio-frequency reactive plasma spraying (rf-RPS) was studied to induce bioactivity of titanium (Ti) coatings. Ti coatings were deposited on Ti substrates by a rf-RPS method using a thermal plasma of Ar gas containing 1-6% N@sub 2@ and/or O@sub 2@ at a input power of 16 kW. Ti powders impregnated with calcium were also sprayed. Composition change of coating's surface during soaked in a simulated body fluid (SBF)@footnote 1@ was examined by micro Fourier transform infrared spectroscopy and thin film X-ray diffraction. Ti coatings prepared with Ar-O@sub 2@ and Ar-N@sub 2@-O@sub 2@ plasma formed apatite after 3 days of soaking in 40 ml SBF. This indicates that such coatings have the ability to form a biologically active bone-like apatite layer on the surface. In the XRD patterns for both Ti coatings, minute peaks ascribable to TiO@sub 2@ (anatase and rutile phase) were commonly observed. On the other hand, composition change of coating's surface cannot be observed for Ti coating sprayed with pure Ar and Ar-N@sub 2@ plasma after 7 days of soaking in SBF. The 0.05-0.2 mol% impregnated Ti coatings prepared with Ar-O@sub 2@ and Ar-N@sub 2@-O@sub 2@ plasma formed apatite after 7 days of soaking in SBF. Thus it seems that calcium impregnation into Ti powders somewhat inhibited to form apatite at surface of coatings. Ti coatings with Ar-N@sub 2@-O@sub 2@ plasma gave excellent adhesion to substrate, whereas Ti coatings with Ar-O@sub 2@ plasma gave poor adhesion. Therefore, surface modification of Ti splat by Ar-N@sub 2@-O@sub 2@ plasma is an effective method to provide excellent adhesion and bioactivity for plasma sprayed Ti coatings. @FootnoteText@ @footnote 1@HM Kim, F. Miyaji, T Kokubo, T Nakamura, J. Biomed. Mater. Res 45, (1999)100-107.

BI-WeP17 RF Plasma Deposition of Acrylic Acid Thin Films: Relationship between Plasma Charaterisation and Films Physicochemical Properties, *N. Rossini, A. Valsesia, G. Ceccone, P. Colpo,* ***F. Rossi***, Joint Research Centre, Italy

Acrylic acid thin films have been deposited by continuous and pulsed RF capacitive discharge. In situ diagnostics (Langmuir probe, Mass spectrometry and Self Excited Electron Resonance Spectroscopy) are used for the different plasma conditions to analyse the framentation processes and identify the species contributing to the growth of the film. The composition and physico chemical properties of the films are analysed with FTIR, XPS, contact angle and Quartz Crystal Microbalance with Dispersive mode. Relationship with plasma characterisation is established. Experimental conditions leading to high concentration of COOH functionalities as well as films stability are determined.

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