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approximately 1 μm at various rf-power of 50, 100, and 200 W. The crystal structure and surface morphology of the coatings were examined by X-ray diffraction (XRD), atomic force microscopy (AFM) and scanning electron microscopy (SEM), respectively. Effects of rf-power on the corrosion behavior of TiN coated Ti-6Al-4V alloy were investigated by various electrochemical techniques, including electrochemical impedance spectroscopy (EIS), potentiodynamic polarization test in Hank’s solution (pH = 7.3) at 37°C. The electrochemical behavior of the coatings was enhanced with increasing rf-power from 50 to 200 W. The TiN films exhibited high protective efficiency, an increasing corrosion resistance with increasing rf-power to a maximum of 91.81% at 200 W. EIS also showed that TiN films at 200 W could improve coating performance due to the highest charge transfer resistance and lowest volume fraction of water uptake in TiN films.

[ID-4510] Guiding Rat Pheochromocytoma Cells (PC12) Differentiation on Modified Polydimethylsiloxane (PDMS) Surface
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Abstract:
Surface modified polydimethylsiloxane (PDMS) is used to guide the differentiation of rat pheochromocytoma cells (PC12). It constitutes an extremely valuable neural model cell and undergoes neural differentiation in response to neuron growth factor (NGF) stimulation. The primary PDMS samples are prepared from Sylgard 184 (Dow Corning), and oxygen plasma immersion ion implantation (PIII) is used to enhance the surface wettability. The patterns on the PDMS substrate are fabricated by soft lithography. The influence of the implanted oxygen ions on the PC12 cells is determined. Almost no living cells are found on the primitive PDMS substrate, but cells are seen to survive on the oxygen-implanted one because of its increased hydrophilicity. Poly-D-lysine is printed on the primitive PDMS sample by stamping using the as-prepared patterned PDMS mold. The living cells are observed to survive on the patterns and synapsed with NGF added after one week of cultivation. All the synapses grow along the patterns and can bifurcate according to the patterns to form the networks. Such a guiding differentiation behavior of PC12 on the modified PDMS surface is confirmed by repeated experiments. Our results suggest that PDMS modified by oxygen PIII technique can render good hydrophilic performance to enhance cell adhesion and PC12 differentiation can be guided on the modified PDMS surface. Applications of the materials to lab-on-a-chip devices particularly pertaining to neuron synapse mechanism research are thus possible.

[ID-4515] Mechanical properties of Al2O3/Al Bi-layer Coated Biomedical AZ91 Magnesium Alloy
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Abstract:
The fast degradation rates of magnesium alloy have become the main limitation for their applications as biodegradable implants. Biocompatible Al2O3/Al bi-layer coating has been successfully deposited on AZ91 magnesium alloy using a filtered cathodic arc deposition system and excellent corrosion resistance of coated alloy has been verified in our previous work. In current work, Mechanical properties of as deposited coating are studies by nanoindentation and scratch tests. XPS, XRD and SEM analysis are carried out to characterize the structure of as-deposited coating. The scratch experiment reveals excellent bonding strength of the coating. Our results demonstrate that the aluminum pre-implantation process prior to deposition further enhances bonding strength of as-deposited coating. The fracture process and mechanism of deposited coating during scratch test are also discussed.

[ID-4547] Study of the interface between sol-gel derived hydroxyapatite and bioactive glass thin films
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