A paradigm shift on surface technology

Literature, Novel

Coating

Modern surface technology has been of great importance in the improvement of the surface properties of cathode materials in order to improve their electrochemical performance. Coating is an important method used in the modification of surfaces to achieve improved electrochemical performance. When the surface of cathode materials including $LiCoO_2$, $LiNiO_2$, $LiMn_2O_4$ and $LiMnO_2$ is coated with oxides such as MgO, Al_2O_3, SiO_2, TiO_2, ZnO, SnO_2, ZrO_2, $Li_2O \cdot 2B_2O_3$-glass and other materials, the coatings prevent the direct contact with the electrolyte solution, improve the structural stability, suppress phase transition, and decrease the disorder of cations in crystal sites. This leads to side reactions and heat generation during cycling are decreased. Improvement in electrochemical performance of electrode materials due to coating include reversible capacity, coulomb efficiency in the first cycle, cycling behavior, rate capability and overcharge tolerance (Li et al. , 2006).

Metal coatings play a very important part in many technological areas. The paradigm shift in surface technology has brought about the required knowledge about the essential properties of thin metal films and small metal particles on oxide supports that has helped to improve theelectronic, mechanical or catalytic performance. The possibility to use thin, well-ordered oxide films as supports for the study of deposited metal particles is greatly important. This method offers the benefit of permitting the unrestricted application of all experimental methods, which rely on a good electrical or thermal conductivity of the sample, like PES, LEED, STM or TDS. From the work done on thin alumina film, it is shown that it is feasible to characterize such systems on a microscopic level with respect to all relevant structural, electronic and adsorption properties (Bäumer & Freund 1999).

Biomaterials

Modern surface technology has made the production of biomaterials possible. For example, precise surface technology has the ability to produce patterns of single or multiple cells of cell culture substrates. This enhanced the development of cellular bioassays that provide entirely new insights into the factors that control cell adhesion to material surfaces, cell proliferation, differentiation and molecular signaling pathways. Controlling of cell shape and spreading of attached cells and cell–cell contacts through the form and dimension of the cell-adhesive patches with high precision is of great important. Surface technology has been of great importance to cell-biological studies, it has helped in the design of cell culture substrates for tissue engineering. Also, for cell patterning so as to allow for arranging cells on transducers to allow for cellbased sensing and cell-based drug discovery concepts. It has also improved in the aspects of biologically motivated micropatterning of two-dimensional (flat) surfaces (Falconnet, Csucs, Michelle Grandin, & Textor, 2006).

Paints

The battle against the fixing of marine organisms onto surfaces immersed in sea water and on ship hulls in particular is a peculiar one. Surface technology brought about the discovery of the use of antifouling paints. These paints are used for anticorrosive protection systems underwater parts of ships and/or other moving structures. In 1960, the first antifouling paints were produced based on the idea of dispersing powerful toxicants in polymeric binders. This was followed by other paints with binders based on different bituminous products and natural resins.

However, because the pigments used in these paints, which were applied in direct contact with the ship'shull, caused corrosion on the first steel hulls, the application of a primer capable of protecting the hull was quick to appear. Since then, the improvement in technologies has allowed the 20th century to improve this method by the creation of toxic pigments, soluble matrix paints, insoluble matrix paints or contact paints, self-polishing paints, etc.