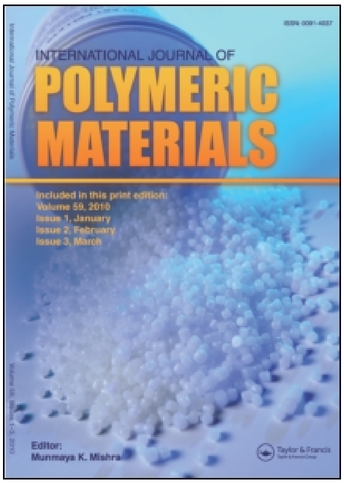

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CHEMICAL AND PHYSICAL PROPERTIES OF INTERFACE

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In this section, the following field will be reviewed:

1. Surface chemistry of polymer
2. Adhesion
3. Adsorption
4. Membrane, Diffusion and Gas permeability

1. Surface Chemistry of Polymer

M. Okubo and S. Kamei *et al.* (2142) reported XPS analysis of the surface concentration of poly(styrene/2-hydroxyethyl methacrylate) microspheres. They observed that the HEMA component was localized at the surface for the lower (HEMA) concentrations. T. Tanizaki and M. Uchida *et al.* (2145) reported the surface analysis of the LB films by contact angle measurement and XPS.

The polymerized LB films in air were more stable than the hydrophobic surface for a long immersion time in the water than the monomeric LB films. When the immobilization of the hydrophobic surface was achieved in the water by the use of the polymerizable amphiphile or $2AC_{16}SNa$ the reverse was observed. These phenomena may be useful in the preparation of biocompatible surfaces. T. Teraya and A. Takahara *et al.* (2148) investigated the surface chemical composition and surface molecular motion of A-B type diblock copolymer copolymers. The surface concentration of PSt/MPEG (methoxy polyethyleneglycol methacrylate) diblock copolymer with OE unit less than 9 was smaller than that of the bulk. On the other hand, the PSt concentration for St/HPEGM (hydroxy polyethyleneglycol methacrylate) diblock copolymers was enriched at the surface. This is due to the hydrophobic effect of the methoxy end groups, the St surface concentration of St/MPEMG with long side chain (n = 23) was larger than that of bulk, the effect of end groups being observed to decrease. MPEGM segments had greater mobility in the water phase but HPEGM segment could not move so greatly at the surface. MPEGM is enriched on the surface of the copolymers, so that the segments can extend more rapidly. HPEGM segments do not appear at the surface to the same extent and the motion of the segments are restricted by PSt segments.

2. Adhesion

S. Tanigawa and K.Nakamae *et al.* (2151) investigated the adhesion of vacuum deposited thin film on polyimide film. Polyimide films were pretreated with oxygen R.F. plasma in order to improve the adhesion of the deposited metal thin films to the polyimide. The surface active functional groups were analysed by ESCA. After plasma pretreatment, the surface was modified by trifluoroacltic-anhydride and pentafluoeobenzaldehyde. F/C by ESCA were correlate with the surface density of functional groups and also the adhesion strength of vacuum deposited metal thin films. I. Chin and C.S.P. Suung (2160) reported the mechanistic studies of adhesion promotion. They investigated the alternative mechanism of adhesion promotion by an organo-silane. Polyethylene and gamma-amino propyl triethoxy silane (APS) were chosen as the polymer matrix and the adhesion promoter. They reported APS forms a multimolecular film when adsorbed or deposited on an aluminum oxide surface. The silane film is not fully cured and dried at room temperature for one hour.

Drying at elevated temperatures leads to further polymerization and possibly to crosslinking as evidenced by IR spectroscopy and thermal analysis. It is strongly suggested that interdiffusion between unoxidized polyethylene and APS silane film may be an important mechanism for the promotion of dry joint strength consisting of polyethylene/APS/aluminum oxide.

3. Adsorption Behaviour

K. Nakamae and S. Tanigawa *et al.* (2154) investigated the effect of coupling agents on the adsorption of binder, dispersion and orientation of magnetic particles. In the magnetic recording media, the adsorption of binder and its conformation were very important to determine the orientation of magnetic particles. The effects of titanate coupling agent and silane coupling on the adsorption behaviour were reported.The adsorption behaviour of these coupling agents was Langmuir type adsorption. Suitable amounts of adsorption improved drastically the dispersibility of magnetic particles and the orientation of the magnetic particles. K. Nakamae and S. Tanigawa *et al.* (2157) investigated the molecular weight dependence of adsorption of polymers having OH groups. For PMMA homopolymer, the high molecular weight species preferentially adsorbed compared to the low molecular weight species. However for P(MMA-AA) the lower molecular weight species preferentially adsorbed and a displacement by the higher molecular weight species did not occur. However for P(MMA-HEMA) a higher molecular weight species preferentially adsorbed similar to PMMA. The displacement by higher molecular weight species depends upon the interaction force between the functional group in the polymers and the γ-Fe_2O_3 surface. K. Kobayashi and K. Araki *et al.* (2163) investigated the adsorption of PMMA on various silica surface on the basis of train-loop adsorption concept. The segment fraction of the train decreases and the segment fraction of long loop increases with decrease of the silanol density on the surface. In the case of Nipsil HD and Aerosil 300, the polymer adsorbed in a flat conformation. For Aerosil R812, the adsorbed polymer attached in a long loop conformation. M. Kawaguchi and K. Itoh *et al.* (2175) reported the competitive and displacement adsorption of PSt and P(St-MMA) copolymer on the basis of the difference in adsorption strength between the polymer segments and the silica surface. H. Kawaguchi and S. Kashihara *et al.* (3604) reported the competitive and sequential adsorption of proteins on Latex particles.

Styrene was copolymerized with acrylamide or acrylamide derivatives, acryloylpyrrolidine and acryloylpiperadine in soap-free aqueous media to obtain latex particles whose surface have different hydrophilicity. At low ionic strength the adsorption of human serum albumin (HSA) and immunoglobulin G (IgG) on the particles was significantly influenced by the electrostatic interaction between protein molecules and latex particles. The amount of both proteins adsorbed on anionic particles increased monotonously with increasing pH. The rate of adsorption was higher for IgG than for HSA in most of the cases examined. When HSA and IgG added to each latex simultaneously, the amount of adsorbed HSA was the same as that observed in the individual adsorption systems. On the contrary, the amount of adsorbed IgG decreased due to the coexisting HSA, especially in the pH range where HSA was highly adsorbed. The preferential adsorption of HSA may be attributed to some irreversible conformational change of this flexible protein.

4. Membrane, Diffusion and Gas permeability

K. Toi and H. Yanagi *et al.* (2181) investigated the gas sorption and permeation in glassy polymers. Y. Kamiya and K. Mizoguchi *et al.* (2184) investigated the sorption and dilation poly(ethyl methacrylate)-carbon dioxide system (2190). H. Kawakami and H. Nishide *et al.*, (2190) investigated the nitrogen permeation mechanism in polymeric manganese complex membrane. Y. Naito and K. Mizoguchi (2193) reported the hydrostatic pressure and plasticizing effects in high-pressure gas permeation through rubbery polymers. T. Uragami and T. Morikawa (2196) reported separation and concentration aqueous alcohol solution through polydimethylsiloxane membranes by permeation and evaporation methods. The permeation rate was increased and the separation factor was decreased with an increase of the ethanol concentration in the feed in both the permeation and evaporation method. They reported the diffusive transport of amino acid mixtures through polymer membranes.

A. Tanioka and K. Miyasaka (2205) reported the several problems in the dual sorption model of adsorption and diffusion of glassy polymer membranes. H. Hachisuka and Y. Tsujita *et al.* (2208) investigated the gas permeability of glassy polymer films having various thermal histories. J. Komiyama and M. Satoh *et al.* (2211) investigated permselectivity to O_2/N_2 of PVA membranes swollen with aqueous solutions of nonvolatile substances. They investigated a new membrane system composed of cross-linked PVA/water/nonvolatile substance. The substances so far tested are CsCl, LiCl-LiI, tetraethylammonium chloride, sodium tetraphenylborate urea, thiourea, hexadecyl trimethylammonium chloride, $ZnCl_2$, Lithium β-naphthalene sulfonate and glycerol.