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**Photochemical Preparation of Phosphorylcholine Group Immobilized-Polymer Surface**

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Polymers with phosphorylcholine group, for example, 2-methacryloyloxyethyl phosphorylcholine (MPC) polymers, provide an excellent biocompatible surfaces. In general, the surfaces are prepared by coating of the polymer, reacting with polymer and grafting the polymer. We have developed new photochemical reaction at the surface of super-engineering plastic to initiate graft polymerization even under aqueous medium [Kyomoto M, Ishihara K. ACS Appl Mater Interfeces 2009, 1(3) 537-542]. When irradiation with UV light is carried out on the poly(ether-ether-ketone) (PEEK), radicals are form at the surface. The monomers surrounding the surface can polymerize during this process. That is, benzophenone units in the main chain of PEEK activated by UV irradiation. To obtain new biomaterials, we prepared poly(MPC)-graft PEEK by self-initiated surface graft polymerization. Around 120 nm in thickness poly(MPC) graft layer was generated by 60 min-irradiation at 60°C. This poly(MPC) layer has good resistance of protein adsorption and cell adhesion as reported and also excellent lubrication on the surface. Dynamic friction coefficient of poly(MPC)-graft PEEK was about 0.01 under 20 MPa loading. It is 0.02 in case of natural cartilage. To enhance polymerization process of MPC, we considered that the effects of inorganic salt in the reaction medium. When NaCl in 2.5mol/L was added in the MPC solution and graft polymerization was carried out, only 5-min irradiation at 25 °C was enough to have 100 nm-graft layer of poly(MPC). That is due to increase in apparent concentration of MPC in an aqueous medium. We are now evaluating performance of this poly(MPC)-graft PEEK as an artificial joint and artificial valve based on easy fabrication process of PEEK.

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Prof. Ishihara graduated Waseda University, Tokyo, Japan (Applied Chemistry) in 1984 and had PhD degree of engineering. After that, he has been in Sagami Chemical Research Center (1984-1986), Tokyo Medical and Dental University (1987-1998). He moved to The University Tokyo in 1998 and has been full professorship since 2000. His research interests include polymer biomaterials, cell-material interactions, biocompatibility of materials, bioinspired chemistry, artificial cell membrane, and biointerfaces. He has been published more than 520 scientific articles, 140 review articles, and 80 books/book chapters. Most importantly, he has developed essential synthetic process of 2-methacryloyloxyethyl phosphorylcholine (MPC) and its polymers as biomaterials. The MPC and MPC polymers are now commercially available and applied for medical devices in various fields worldwide. He received several scientific awards, for example, Technical Progress Award of Japanese Society of Artificial Organs (2000, and 2011), Award of Japanese Society for Biomaterials (2001), Inoue-Harushige Award from Japan Science and Technology Agency (2004), Frank Stinchfield Award, The Hip Society, The American Academy of Orthopedic Surgeons (2006), Clemson Award, Society for Biomaterials (2009), High-technology Award: Award of Ministry of Economy, Trade and Industry, Japan (2011), Industrial Award: Fine Ceramic Society, Japan (2013), and Award of Society of Polymer Science, Japan (2014).

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