Poly(2-methacryloyloxyethyl phosphorylcholine) (PMPC) is considered to be promising novel polymeric biomaterial for orthopedic and spinal applications, because PMPC exhibits excellent mechanical properties, chemical stability, non-magnetic nature, as compared with polyethylene or metallic materials.

**INTRODUCTION**

Polyether-ether-ketone (PEEK) is a mostly polyether-ether-ketone (PEEK) considered to be promising novel polymeric biomaterial for orthopedic and spinal applications, because PEEK exhibits excellent mechanical properties, chemical stability, non-magnetic nature, as compared with polyethylene or metallic materials.

**PURPOSE**

We have demonstrated the fabrication of highly hydrophilic and biocompatible nanometer-scale modified surface by "self-initiated surface graft polymerization" of 2-methacryloyloxyethyl phosphorylcholine (MPC) [1].

**METHODS**

Self-initiated graft polymerization of PMPC on PEEK surface

PEEK and carbon fiber reinforced PEEK (CFR-PEEK) specimens were immersed in MPC aqueous solution of 0.5 mol/L. Photoinduced graft polymerization was carried out at 60 °C in a nitrogen atmosphere for 24 h.

**RESULTS**

Photo-initiator analyzed by ESR

The peaks ascribed to semi-benzoxacin radical were clearly observed in ESR spectra.

**DISCUSSION**

The wettability of PMPC-grafted PEEK and CFR-PEEK are considerably greater than those of the untreated PEEK and CFR-PEEK, because of the presence of a nanometer-scale PMPC layer. PMPC is water-soluble. The coefficient of dynamic friction was dependent on the wettability. The novel, simple, and safer self-initiated surface graft polymerization on the PEEK surface making unique properties such as lubricity and high wear-resistance by PMPC grafting is novel phenomena in the field of orthopedic surgery: e.g., PEEK layer prevents damages of metal counter surface, regardless of the carbon fiber content of the CFR-PEEK [Fig. 8] [4].

**CONCLUSION**

We successfully demonstrated the fabrication of highly hydrophilic and biocompatible nanometer-scale modified surface by PMPC grafting onto the surface of a self-initiated PEEK and CFR-PEEK, and the PMPC-grafted PEEK and CFR-PEEK can result in the next-generation smart orthopedic biomaterials.