CHAPTER V

CONCLUSION AND SUGGESTION

Poly(2-methacryloyloxyethyl phosphorylcholine) (PMPC) brushes can be prepared by surface-initiated atom transfer radical polymerization (ATRP) from the surfaces bearing α-bromoester groups using CuBr/bpy as a catalyst. Polymerization from surface occurred more rapidly in aqueous media than in alcoholic media. The thickness of polymer brushes can be controlled by reaction time. The graft density of PMPC brushes synthesized is approximately 0.95 chain/nm^2. The N_{1s} and P_{2p} contents from XPS analysis indicated that phosphatidylcholine analogous groups are present on the surface of PMPC brushes. The N/P ratios varying in the range of 0.7-0.8 reasonably agree with the stoichiometric ratio of MPC unit. As demonstrated by water contact angle measurements, the surfaces having PMPC brushes were more hydrophilic than the surface bearing α-bromoester groups (θ_A/θ_R ~71/62°) which is an indication of hydrophilic phosphorylcholine moieties. The independence of water contact angles on the thickness of PMPC brushes evidently implied that the growing of each polymer brush is simultaneous and living in character (θ_A/θ_R ~44/24°). The AFM analysis suggests that all PMPC brushes having the thickness in the range of 10-50 Å are quite smooth and have an average roughness (R_a) in the range of 0.25-0.30 nm. According to protein adsorption and platelet adhesion studies, PMPC brushes are blood compatible independence of the solvent used for the reaction and the thickness. This study has also demonstrated that the formation of PMPC brushes is an effective way in generating blood compatible surface which is very useful for biomedical applications.

The graft density of PMPC brushes is another parameter that should be determined with respect to the blood compatibility. Our future direction will focus on the formation of PMPC brushes having different graft density. We are also interested in exploring the possibility to distribute PMPC brushes microscopically

and nanoscopically on the surface. The results should be very beneficial to the development of nanotechnology for a broad range of biomedical-related applications.