PHOSPHORYLCHOLINE-BASED DIBLOCK AND RANDOM BRUSH COPOLYMERS

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Poly(2-methacryloyloxyethyl phosphorylcholine) (pMPC) is known as hydrophilic polymer with phosphorylcholine head groups which deliver unique properties – antifouling effect, penetration across cell plasma, fluid lubrication, etc. [1]. In a current work, a zwitterionic monomer MPC and an amphiphilic macromonomer poly(ethylene oxide) methyl ether methacrylate with different length (PEO_9MEMA or PEO_{19}MEMA) were selected to design a new zwitterionic brush copolymers that have promising potential for biomedical applications such as cartilage lubrication.

Random and diblock brush copolymers MPC-PEO_xMEMA (Fig. 1) were synthesized by RAFT polymerization using 4-(((butylthio)carbonothioyl)thio)-4-cyanopentanoic acid as a chain transfer agent (CTA) and 4,4′-azobis(4-cyanovaleric acid) as an initiator [2]. For the synthesis of the diblock copolymers, pMPC was polymerised first, precipitated, purified, dried, and then dissolved again for the synthesis of the second block of p(PEO_{19}MEMA) or p(PEO_9MEMA). The synthesized copolymers were studied by size exclusion chromatography with triple detection, ^{1}H NMR and FT-IR spectroscopy.

A series of random brush copolymers p(MPC-PEO_{19}MEMA) with degree of polymerization (DP) up to 100 and dispersity index Đ 1.3–1.4 and containing different amount of MPC units were synthesized. In another series of the copolymers, the block of pMPC with DP about 40 or 80 was rather monodisperse (Đ about 1.2) but the chain extension by the units of PEO_9MEMA or PEO_{19}MEMA was less successful giving diblock copolymers with higher dispersity (Đ about 1.5 and 1.6, respectively).

Study of biotoxicity and lubrication properties of the synthesized zwitterionic random and diblock brush copolymers p(MPC-PEO_xMEMA) is in progress.

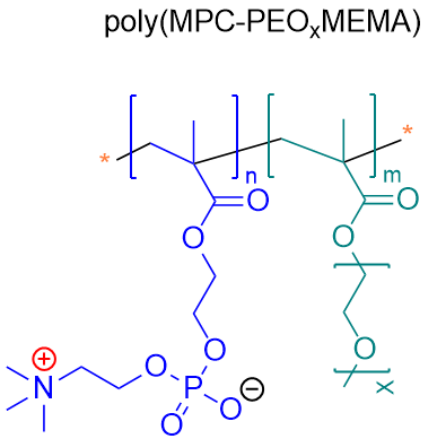

Fig. 1. Structure of random and diblock brush copolymers p(MPC-PEO_xMEMA)

References

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