

Immobilization of biomacromolecules on poly(pentafluorophenyl acrylate) grafted surfaces

김수라, Li Sheng[†]

한국과학기술원

(shengli@kaist.ac.kr[†])

Reactive pentafluorophenyl acrylate (PFPA) polymer grafted substrate surfaces can be utilized for immobilization of biomacromolecules. In this study, we demonstrate a method to prepare poly(PFPA) grafted surfaces via a simple two-step process. In the first step, 3-aminopropyltriethoxysilane (APTES) is deposited as a linker molecule onto the SiO₂ surface. In the second step, poly(PFPA) homopolymer, synthesized via the reversible addition and fragmentation chain transfer (RAFT) polymerization, is grafted to the linker molecule through the exchange reaction between the pentafluorophenyl (PFP) units on the polymer and the amine groups on APTES. Prior to biomolecule immobilization, control of surface hydrophilicity of the polymer grafted substrate is also important. By partial substitution of the PFP units with various hydrophilic molecules, we show that a balance between desired surface hydrophilicity and number of free PFP units available for immobilization reaction can be achieved. The optimized poly(PFPA)-grafted substrate surface is immobilized with antibody and successfully utilized in the detection of a range of biomolecules, including proteins, DNAs, and RNAs.