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Effects of Ar ion irradiation in NH₃ environments on polytetrafluoroethylene(PTFE) surface for graft copolymerization of EDTA

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The Ion Assisted Reaction(IAR) process could successfully create the hydrophilic functional groups on polymer surface. However, the hydrophilic groups formed by IAR is rotatable along the polymer chain, and diffuse toward polymer bulk with time in hydrophobic environments (ex: Air-environments), resulting in the decrease of hydrophilic functional groups on the surface. In order to prevent the hydrophilic functional groups formed by IAR with time, the graft copolymerization of EDTA on the IAR treated PTFE surface was performed to bind the new polymer chain with the IAR induced functional groups. Firstly, PTFE was irradiated by Ar ion of 1 keV in NH₃ environments with the ion dose of 5×10^{15} to 1×10^{17} ions/cm², resulting in the formation of hydrophilic groups on the surface. Secondly, EDTA was grafted through the reaction of EDTA with NH_x groups formed on the IAR-treated PTFE surface. In this experiments, the effects of Ar ion irradiation in NH₃ environments on PTFE for graft copolymerization of EDTA was investigated with contact angle, SEM, FT-IR, and XPS. The effects of EDTA graft on the retardation of decrease of hydrophilicity would be discussed in terms of the chemical states of IAR-treated PTFE, and the reaction of co-polymer with the IAR-treated surface.