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keV Ion Irradiation on Polymer in Reactive Environment

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A keV ion irradiation in reactive environment was developed to improve polymer's surface properties which are wettability, adhesion, etc. Energy of argon or oxygen ions is changed in the range of 0.5 to 1.5 keV, and the amounts of ions in 10^{14} to 10^{17} ions/cm². The reactive environment is changed with introduction of various flow rate(0-6 ml/min) of reactive gases (hydrogen, nitrogen, and oxygen) with the ion irradiation. Advantages of keV ion irradiation such as enhancing process, productivity, economics, etc., and the differences between the keV ion irradiation and the 100 keV ion irradiation are discussed with comparing the results of high energy (100s keV) ion irradiation. Formation of chemical reaction is explained by two-step-process in which the first step is a creation of reactive chains due to ion irradiation and the second step is chemical reaction between the reactive chains and reactive gases. The wettability change mechanism in the keV ion irradiation process is suggested by the results of FT-IR, XPS, wetting angles with various doses of ions and with various flow rate of reactive gases.