플라즈마 중합에 의한 표면개질

Surface Modification by Plasma Polymerization

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The surface modification of materials by the plasma polymerization coating has received considerable attention due to the excellent properties of those films that impart the various functionality by the careful selection of plasma monomer and reaction conditions. For example, Teflon-like surface or silicon-like surfaces can be easily formed by the plasma polymerization of fluorocarbon or organosilicon monomer respectively. Recently, great research efforts have accumulated with respect to the practical applications of plasma polymers such as the protective coating, separation membrane, primer coating, electronic or optical devices. For these applications, the selective and reproducible control of the chemical structure, property, and the deposition rate of plasma polymer is strictly required.

For these several years we have been worked with the organosilicon compounds and the nitrogen-containing heterocyclic compound. Generally the plasma polymerized organosilicon yielded the very hydrophobic low energy surface. In contrast, the plasma polymerized nitrogen heterocycle yielded the hydrophilic high energy surface. We investigated extensively the detailed control of the chemical structure, surface energy, density, optical or electrical properties by the operational parameters of plasma polymerization, such as the discharge power, system pressure, flow rate, substrate temperature. The importance of the specific energy per mass of molecule was readily identified as the major parameter of structure control. The deposition rate equation was proposed from the simplified model of plasma polymerization reaction and was tested by the experimental deposition rates of organosilicon compounds. Most recently, using the semiconducting plasma polymerized pyrrole film we could prepare a first field effect transistor.