

## 論文の要旨 (Abstract)

### 題目: Copolymerization of Norbornene with Conjugated Hydrocarbon Monomers using Anilinonaphthoquinone-ligated Nickel Complexes

(アニリノナフトキノン配位子を有するニッケル錯体によるノルボルネンと共役系炭化水素モノマーとの共重合)

氏名: MD. SAMIUL ISLAM CHOWDHURY

Optical plastics are useful materials because of their high processability and strength comparing to glass. Polycarbonate (PC) and poly(methyl methacrylate) (PMMA) are widely used optical plastics. PC shows good heat resistivity and transparency, while PMMA possesses good transparency with low birefringence but poor heat resistance. Both of them suffer from water absorption because of their polar groups.

Norbornene-based polymers possess high thermal stability, heat resistance, transparency, chemical resistance, humidity resistance and low birefringence. The research on norbornene (NB) polymerization with late transition metal single-site catalysts has been directed to coordination-insertion polymerization rather than ring-opening metathesis polymerization. The bicyclic structure in the main chain of 2,3-added polynorbornene (PNB) gives excellent properties as optical plastic. However, the high glass transition temperature ( $T_g$ ) close to its decomposition temperature prohibits us to process PNB by melt processing. Therefore, the coordination-insertion copolymerization of NB with other monomers are important to control the  $T_g$  value with keeping or improving the optical and mechanical properties of PNB.

In this dissertation, anilinonaphthoquinone-ligated nickel complexes  $[\text{Ni}(\text{C}_{10}\text{H}_5\text{O}_2\text{NAr})(\text{Ph})(\text{PPh}_3)]$ : **1a**, Ar =  $\text{C}_6\text{H}_3\text{-2,6-}^i\text{Pr}$ ; **1b**, Ar =  $\text{C}_6\text{H}_2\text{-2,4,6-Me}$ ; **1c**, Ar =  $\text{C}_6\text{H}_5$ ] were applied for copolymerization of NB with conjugated hydrocarbon monomers. **1a** was reported to be an excellent catalyst for NB polymerization, and **1c** was synthesized in this dissertation for the first time.

In Chapter II, NB/styrene (St) copolymerization was studied activated by MMAO and  $\text{B}(\text{C}_6\text{F}_5)_3$  as a cocatalyst. The investigation focused the effects of ligand, reaction conditions and reactivity ratios of the catalyst on NB/St copolymerization. The physical properties of the obtained copolymers were also investigated.

In Chapter III, NB/*p*-substituted styrene (XSt) copolymerization was conducted activated by MMAO as a cocatalyst. The effect of ligand and reaction conditions on NB/XSt copolymerization were investigated. The physical and mechanical properties of the obtained copolymers were measured.

In Chapter IV, NB/divinyl benzene (DVB) copolymerization was conducted activated by MMAO as a cocatalyst. The effects of ligand, reaction conditions on NB/DVB copolymerization were investigated. The NB/DVB copolymer containing pendent styryl groups was modified to functional groups and also used as a macromonomer for graft polymerization of methyl methacrylate. The physical and mechanical properties of the obtained polymers were measured.

In Chapter V, copolymerization of NB with conjugated diene (CDN) i.e., butadiene (BD) or isoprene (IP) was conducted activated by MMAO. The effects of ligand, reaction conditions on NB/CDN copolymerization were investigated and the physical and mechanical properties of the obtained copolymers were measured.

In Chapter VI, the results obtained in the present study were summarized.