

BIMETALLIC ALUMINUM CATALYSTS FOR RING-OPENING POLYMERIZATION OF EPOXIDES AND CYCLIC ESTERS

Narongchai Kanhanond, Khamphree Phomphrai*

Department of Materials Science and Engineering, School of Molecular Science and Engineering, Vidyasirimedhi Institute of Science and Technology (VISTEC), Wangchan, Rayong 21210, Thailand

A new series of dinuclear aluminum dimethyl complexes bearing constrained 'inden' ligands has been synthesized and fully characterized. The orientation of the two Al atoms in the bimetallic aluminum complexes was identified and influenced by the ligand backbone rigidity. The aluminum complex **2A** bearing rigid hydrazine bridging moiety displays a C_2 -symmetry with unprecedented perpendicular orientation between the two phenoxy ligand frameworks. On the other hand, the analogous aluminum complex **2B** associated with more flexible ethylene bridging moiety exhibits a C_i symmetry with a trans orientation between Al-Al center. The novel aluminum complexes display promising catalytic activity for the ring-opening polymerization of ϵ -caprolactone (CL) to obtain poly(ϵ -caprolactone) (PCL) with narrow polydispersity at room temperature. Remarkably, high molecular weight PCL up to nearly 150 kDa can be obtained using complex **2A** at the very low catalyst loading (0.0125 mol%). In addition, these novel aluminum catalysts have shown their potential to catalyze the ring-opening polymerization of other cyclic monomers, e.g., δ -valerolactone (VL), *L*-lactide (LA), and cyclohexene oxide (CHO).

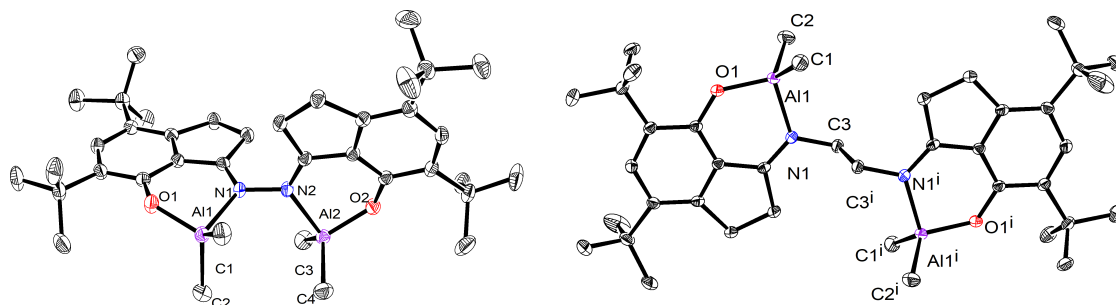


Fig. 1. Molecular structure of complex **2A** (left) and complex **2B** (right)