

Dioxybiphenyl and chiral dioxybinaphthyl polyphosphazene random copolymers carrying carboxylic acids and their reactions with ϵ -caprolactam to form nylon-6-branched phosphazene materials

Carriedo, Gabino A.

Alonso, Francisco J. García

Valenzuela, Carlos Díaz

Valenzuela, María Luisa

The phosphazene polymers carrying phenoxy-carboxylic acids $\{[\text{NP}(\text{O}-\text{C}_6\text{H}_4-\text{CO}_2\text{H})_2]_x[\text{NP}(\text{O}-\text{C}_{12}\text{H}_8)_2]_{1-x}\}_n$ [$x = 0.2$ (1a), 0.35 (1b), 0.5 (1c), 0.7 (1d), 0.85 (1e), $x = 1$ (2)] and the chiral analogues $\{[\text{NP}(\text{O}-\text{C}_6\text{H}_4-\text{CO}_2\text{H})_2]_x[\text{NP}(\text{O}-\text{C}_{20}\text{H}_{12})_2]_{1-x}\}_n$ [$x = 0.2$ (3a), 0.45 (3b), 0.7 (3c)] ($\text{O}-\text{C}_{12}\text{H}_8 = 2,2'$ -dioxybiphenyl, $\text{O}-\text{C}_{20}\text{H}_{12} = R$ -2,2'-dioxy-1,1'-binaphthyl) have been synthesized by hydrolysis of the corresponding precursors with $[\text{NP}(\text{O}-\text{C}_6\text{H}_4-\text{CO}_2\text{Pr})_2]$ units. The new polymers have extensive H-bonding between the -COOH groups in the solid state, and those with $x > 0.5$ are very soluble in aqueous 0.5 M sodium carbonate. These polymers were used as initiators of the ring-opening polymerization of the ϵ -caprolactam (ϵ -CL) at 230°C to give un-cross-linked polyphosphazenes, branched with short polyamide chains but having a fraction of the phosphazene units (from 20 to 35%) modified by secondary reactions. © 2005 American Chemical Society.