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Carbon Dioxide-Based Copolymers with Various Architectures

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Abstract:

This review highlights recent advances in the synthesis of carbon dioxide (CO_2)-based copolymers with both linear (di-, tri-, and multi-block, etc.) and non-linear (star-block and grafting) architectures. The corresponding catalytic systems are summarized. The microstructure and polymerization mechanism of various types of CO_2-based copolymers, including block polycarbonates and block copolymers of polycarbonate with polyester, polyether, polyvinyl, and polydiene are discussed. The junction unit between two blocks, which indicates an abrupt change in the chain microstructure and property, is emphasized to define the microstructure of CO_2-based block copolymers. Special attention was paid to one-pot terpolymerization for the synthesis of CO_2-based block and grafting copolymers. Finally, the thermal, mechanical, and degradation properties and self-assembly of CO_2-based block and grafting copolymers are reviewed. Prospective future research and applications of this new class of polymeric materials are discussed.

Keywords: block copolymer, carbon dioxide, epoxide, lactide/lactone, cyclic anhydride, junction