Preparation of Bio-Degradable High-Molecular-Weight Aliphatic Polycarbonates Using CO_2 as a Feedstock

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Poly(1,4-butylene carbonate) (PBC) can be prepared by condensation polymerization of dimethyl carbonate and aliphatic diols. Dimethyl carbonate was prepared in industry using hazardous phosgene but currently it is benignly produced in a large scale using carbon dioxide. An aliphatic diol, 1,4-butanediol is an inexpensive chemical produced in a large scale in industry. PBC is attractively semi-crystalline polymer (Tm, 60oC) and also bio-degradable. However, there have been few reports that describe successful preparation of high-molecular-weight aliphatic polycarbonate through the condensation polymerization of dimethyl carbonate and aliphatic diols. Here, we disclose a preparation strategy for high-molecular-weight aliphatic polycarbonates of which Mw values are in the range of 100000-300000.