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(54) Title: RIGID POLYURETHANE FOAM HAVING A SMALL CELL SIZE

(57) Abstract: A rigid polyurethane (PU) foam having a number average cell size of no greater than 10μm. The rigid PU foam is prepared by a method that includes using carbon dioxide to provide a pressure at a first predetermined value on a polyol mixture. The polyol mixture includes a polyol, a catalyst and a surfactant. The pressure is maintained at the first predetermined value for a first predetermined time to increase a carbon dioxide concentration in the polyol mixture. An isocyanate is mixed with the polyol mixture to form a polyurethane reaction mixture. The pressure on the polyurethane reaction mixture is optionally maintained at the first predetermined value for a second predetermined time. The pressure on the polyurethane reaction mixture is then increased from the first predetermined value to a second predetermined value greater than the first predetermined value. The polyurethane reaction mixture is then released at a predetermined depressurization rate from the pressure after a third predetermined time to prepare the rigid PU foam, where the third predetermined time is less than 30 minutes.