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United States Patent [19][11] **Patent Number:** **5,530,077****DeSimone et al.**[45] **Date of Patent:** **Jun. 25, 1996**[54] **MULTI-PHASE POLYMERIZATION PROCESS**[75] Inventors: **Joseph M. DeSimone**, Chapel Hill; **Timothy Romack**, Durham, both of N.C.[73] Assignee: **The University of North Carolina at Chapel Hill**, Chapel Hill, N.C.[21] Appl. No.: **450,373**[22] Filed: **May 25, 1995****Related U.S. Application Data**

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[51] **Int. Cl.⁶** **C08F 2/16**[52] **U.S. Cl.** **526/89; 526/942; 526/255; 526/344; 526/329.7; 526/346; 526/331; 526/295**[58] **Field of Search** **526/89, 942**[56] **References Cited****U.S. PATENT DOCUMENTS**

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The present invention provides a multi-phase polymerization process for making a water insoluble polymer. The process includes (1) providing a mixture comprising carbon dioxide and an aqueous phase, and containing a monomer and a polymerization initiator, and (2) polymerizing the monomer in the reaction mixture. The monomer may be a hydrocarbon or a fluorinated monomer. The polymerization initiator may be soluble in the aqueous phase, soluble in carbon dioxide, or insoluble in both the aqueous phase and carbon dioxide, such that the initiator forms a separate phase.

The present invention also provides multi-phase polymerization reaction mixtures useful in the process of making water insoluble polymers.

19 Claims, No Drawings