CLAIMS

What is claimed is:

1. A process to form a thermoplastic elastomeric material, the thermoplastic elastomer comprising an elastomer and a thermoplastic resin, the elastomer and the thermoplastic resin being present in a weight ratio in the range of 55:45 to 80:20, wherein the elastomer is derived from C_4 to C_{12} isoolefin monomers and the thermoplastic resin is selected from the group consisting of polyamide resins, polyester resins, polynitrile resins, polymethacrylate resins, polyvinyl resins, cellulose resins, fluorine resins, polyimide resins, polysulfones, polyacetals, polylactones, styrene-maleic anhydrides, aromatic polyketones, and mixtures thereof, the process comprising:
   a. injecting a supercritical fluid into the thermoplastic elastomeric material as the material is mixed in an extruder; and
   b. mixing the material under conditions such that the thermoplastic elastomeric material is dynamically vulcanized wherein the elastomer forms a discontinuous phase of small particles in a continuous phase of the thermoplastic resin.

2. The process as claimed in claim 1, wherein the supercritical fluid is an inert gas.

3. The process as claimed in claim 1 or 2, wherein the pressure in the extruder is above the supercritical pressure of the supercritical fluid.

4. The process as claimed in any one of claims 1 to 3, wherein the supercritical fluid is injected in the extruder downstream of an inlet feeder for the elastomer and thermoplastic resin.

5. The process as claimed in any one of claims 1 to 4, wherein the process further comprises removing the dynamically vulcanized material from the extruder and directly forming the extruded dynamically vulcanized material into a film.

6. The process as claimed in claim 5, wherein the process further comprises passing

the film through at least one set of rolls wherein the cross-sectional thickness of the film is reduced.

7. The process as claimed in claim 6, wherein the thermoplastic elastomeric film, prior to reduction of the cross-sectional thickness, has a thickness in the range of 0.1 to 10 mm.

8. The process as claimed in claim 6 or 7, wherein the cross-sectional thickness of the thermoplastic elastomeric film is reduced by at least 50% at passes through the at least one set of rolls.

~~9. The process of any one of claims 1 to 8, wherein the elastomer is derived from C_4 to C_{12} isoolefin monomers and the thermoplastic resin is selected from the group consisting of polyamide resins, polyester resins, polynitrile resins, polymethacrylate resins, polyvinyl resins, cellulose resins, fluorine resins, polyimide resins, polysulfones, polyacetals, polyactones, styrene-maleic anhydrides, aromatic polyketones, and mixtures thereof.~~

~~10. A process to prepare a thermoplastic elastomeric material film, the process comprising:~~

~~preparing a thermoplastic elastomeric material, the thermoplastic elastomer comprising an elastomer and a thermoplastic resin, wherein the elastomer and the thermoplastic resin are present in a weight ratio in the range of 55:45 to 80:20;~~

~~forming the thermoplastic elastomeric material into a film; and~~

~~passing the film through at least one set of rolls wherein the cross-sectional thickness of the film is reduced.~~

~~11. The process as claimed in claim 10, wherein, either during or after preparing the thermoplastic elastomeric material, the amount of a plasticizer in the thermoplastic elastomeric material is reduced.~~

~~12. The process as claimed in claim 11, wherein the plasticizer is reduced by removal of any plasticizer that is volatized during or after preparation of the thermoplastic~~

~~elastomeric material.~~

~~13.~~9. The process as claimed in any one of claims ~~10 to 12~~ 5 to 8, wherein, after preparing the thermoplastic elastomeric material, the material is passed through a fluidized bed dryer.

~~14.~~10. The process as claimed in any one of claims ~~10 to 13~~ 5 to 9, wherein the thermoplastic elastomeric material is initially formed into a film by ram extrusion, hot pressing, or sintering of the thermoplastic elastomeric material.

~~15. The process as claimed in any one of claims 10 to 14, wherein the thermoplastic elastomeric film, prior to reduction of the cross-sectional thickness, has a thickness in the range of 0.1 to 10 mm.~~

~~16. The process as claimed in any one of claims 10 to 15, wherein the cross-sectional thickness of the thermoplastic elastomeric film is reduced by at least 50% at passes through the at least one set of rolls.~~

~~17.~~11. The process as claimed in any one of claims ~~10 to 16~~ 5 to 10, wherein the reduced cross-sectional thickness of the thermoplastic elastomeric film is in the range of 0.01 to 0.95mm.

~~18.~~12. The process as claimed in any one of claims ~~10 to 17~~ 5 to 11, wherein as the film passes through the at least one set of rolls, a layer of adhesive is applied to at least one facing surface of the film.

~~19. The process as claimed in any one of claims 10 to 18, wherein the elastomer is derived from C_4 to C_{12} isoolefin monomers and the thermoplastic resin is selected from the group consisting of polyamide resins, polyester resins, polynitrile resins, polymethacrylate resins, polyvinyl resins, cellulose resins, fluorine resins, polyimide resins, polysulfones, polyacetals, polyacetones, styrene-maleic anhydrides, aromatic polyketones, and mixtures thereof.~~

~~20. A film made by the process as claimed in any one of claims 10 to 19.~~