

CLAIMS

What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. A self-assembled multiblock crosslinked polymer material comprising at least two polymer chains, wherein each chain has distinct blocks and the material comprises at least two classes of pores: macropores, and mesopores, at least a portion of at least one class of which are isoporous, wherein at least a portion of at least one block is crosslinked to at least one different site on at least one of said at least two polymer chains.
2. The material of claim 1, wherein the material is one of asymmetric or symmetric.
3. The material of claim 1, wherein the material comprises mesopores in the range of about 1 nm to about 200 nm, and macropores of from about 200 nm to about 100 microns
4. The material of claim 1 wherein the material is formed into a two-dimensional structure.
5. The material of claim 1 wherein the material is formed into a three-dimensional structure.
6. A method of preparing a self-assembled multiblock crosslinked polymer material, comprising forming an isoporous structure with both macropores and mesopores from a multiblock copolymer, then crosslinking at least a portion of at least one block with a chemical reaction.
7. The method of claim 6 wherein the isoporous material is formed by:

- a. Dissolution of multiblock polymer and optionally crosslinking agent, in at least one chemical solvent
- b. Dispensing polymer solution onto a substrate or mold, or through a die or template
- c. Removal of at least a portion of chemical solvent
- d. Exposure to a nonsolvent causing precipitation of at least a portion of the polymer
- e. Optionally, a wash step
- f. Optionally, exposure to a crosslinking agent
- g. Crosslinking reaction

8. The method of claim 7 wherein the crosslinking agent comprises a multifunctional thiol compound with two or more reactive thiols, optionally a photoinitiator which generates radicals upon UV radiation exposure, and at least a portion of at least one polymer block comprises a crosslinkable polymer unit comprising at least one reactive double bond.

9. The method of claim 7 wherein the polymer contains at least one block comprising at least one aromatic ring that crosslinks upon UV radiation exposure with or without a photoinitiator which generates radicals upon UV radiation exposure.

10. The method of claim 7 wherein the crosslinking agent comprises a multifunctional halide compound with two or more reactive halide groups selected from bromine, chlorine, or iodine, and at least a portion of at least one polymer block comprises a crosslinkable polymer unit comprising at least one reactive amine.

11. The method of claim 7 wherein the crosslinking agent comprises a multifunctional α,β -unsaturated carbonyl compound with two or more reactive α,β -unsaturated carbonyl units, and at least a portion of at least one polymer block comprising a crosslinkable polymer unit comprises at least one reactive amine.

12. The method of claim 7 wherein the crosslinking agent comprises a halide and α,β -unsaturated carbonyl compound with two or more reactive groups comprising at least one α,β -unsaturated carbonyl unit and at least one halide, and at least a portion of at least one polymer block comprising a crosslinkable polymer unit comprising at least one reactive amine.
13. The method of claim 7 wherein more than one distinct chemical reaction generates crosslinks on at least a portion of one polymer block.
14. A process separating or detecting an analyte of interest contacting a medium containing the analyte of interest with a material of claim 1.
15. A device such as: a pleated pack, flat sheets in a crossflow cassette, a spiral wound module, hollow fiber, a hollow fiber module, or a sensor comprising the material of claim 1.
16. The material of claim 1, wherein the material is used as a separation media, or as a fabric with desirable protective properties.
17. The material of claim 1, wherein the crosslinked material exhibits increased resistance to temperature or harsh media compared to the uncrosslinked material.