degree of breathability, but are lacking in the necessary durability for its applications.

Thus, there remains a need in the art for porous composites that are inexpensive, widely available, easy to use and attach and has outstanding characteristics of both structural integrity and breathability.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention, there is provided a porous article comprising a porous expanded polytetrafluoroethylene (ePTFE) membrane; a coherent irregular network comprising particles of at least one thermoplastic fluoropolymer fused together; and an adjacent region positioned between said ePTFE membrane and said coherent irregular network, said porous expanded ePTFE membrane being attached to the coherent irregular network at the adjacent region, wherein the coherent irregular network comprises open areas, and wherein at least one of the open areas is greater than 100 μm in size, wherein the size of an open area is defined as the distance of the longest straight line that can be drawn across the open area.

According to a second aspect of the present invention, there is provided a porous article comprising: a porous expanded fluoropolymer membrane and a coherent irregular network comprising particles of at least one thermoplastic polymer fused together, wherein a surface of said porous expanded fluoropolymer membrane comprises at least one adjacent region at which said coherent irregular network is attached. wherein the coherent irregular network is attached to said expanded fluoropolymer membrane at only a portion of the adjacent region, wherein the coherent irregular network comprises open areas, wherein at least one of the open areas is greater than 100 μm in size, wherein the size of an open area is defined as the distance of the longest straight line that can be drawn across the open area, wherein said at least one thermoplastic polymer is a thermoplastic fluoropolymer, and wherein the particles of the at least one thermoplastic fluoropolymer have a melt flow index (MFI) between 0.3 g/10 min and 10g/10 min when tested at 372 °C and 2.16 kg load.

According to a third aspect of the present invention, there is provided a porous article comprising: a porous expanded fluoropolymer membrane; and a coherent irregular network comprising particles of at least one thermoplastic polymer fused together; wherein a surface of said porous expanded fluoropolymer membrane comprises at least one adjacent region at which said coherent irregular network is

attached, wherein the coherent irregular network is attached to said expanded fluoropolymer membrane at only a portion of the adjacent region, wherein said coherent irregular network and said expanded fluoropolymer membrane have an attached area ratio between 0.05 to 0.25, wherein said coherent irregular network comprises open areas, wherein at least one of the open areas is greater than 100 μm in size, wherein the size of an open area is defined as the distance of the longest straight line that can be drawn across the open area, wherein said at least one thermoplastic polymer is a thermoplastic fluoropolymer, and wherein the particles of the at least one thermoplastic fluoropolymer have a melt flow index (MFI) between 0.3 g/10 min and 10g/10 min when tested at 372 °C and 2.16 kg load.

Porous articles having an expanded fluoropolymer layer and a coherent irregular network of thermoplastic particles attached thereto are described herein. In one embodiment of the invention the porous article has the coherent irregular network on both a first and second surface, and in other embodiments the coherent irregular network is only on a first surface. The porous article is permeable and in some embodiments the specific resistance is less than 2400 krayls and greater than 0.24 krayls. The porous article of the present invention is provided in some embodiments as being dimensional stability and having a percent area shrinkage of less than 20% as measure and defined herein. In addition, the porous article in some embodiments is provided with a coherent irregular network having a pattern, such as an embossed, linear, discrete, connected and the like as described herein.

Another embodiment of the invention provides an expanded fluoropolymer in a tube, rod, sheet or membrane form. In one embodiment the expanded fluoropolymer is expanded PTFE.

In one embodiment of the invention, the coherent irregular network is provided with open areas, and in some embodiments these open areas are greater than 50 microns in size. In addition, a coherent irregular network having bridging is provided in some embodiments. The coherent irregular network is further provided having a thickness greater than 5 micron, or is some embodiments greater than 5 microns but less than 500 microns. In one embodiment of the invention, the coherent irregular network is provided and defined by an Sp value of greater than 35 microns on at least one surface of the porous article. In some embodiments the coherent irregular network is provide having a BET surface area of at least $0.35 m^2/g$, and in other embodiments between $0.25 m^2/g$ and $5 m^2/g$.