3D hierarchical isotropic porous materials with hydrophilic channels from direct self-assembly of block copolymer

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3D porous materials with hierarchical structure are attractive for a variety of applications such as storage, catalysis, transport, biological and artificial systems. However, the development of bioinspired materials with the long-range order at meso- and microscale via simple methods is still challenging (*1, 2*).

Here we report a simple method to obtain new 3D hierarchical structure by combining nucleation and growth and block copolymer self-assembly. The method consists only in dissolving a standard AB block-copolymer in a specific solvent or mixture of solvents, followed by casting the solution on a substrate. We obtain a long-range order of micrometer size capsules, which are interconnected by ordered hydrophilic cylindrical nanochannels (Fig. 1). The resulting porous materials obtain by using this method could be considered as important starting platforms for separation applications by using specific membrane systems controlled at the macromolecular level.

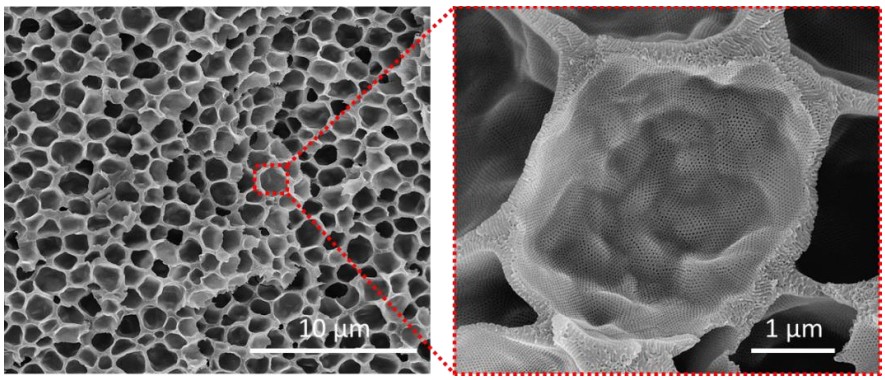


Fig. 1. SEM images of the bulk showing the presence of the hydrophilic channels

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References

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