

Simple approach to mesoporous carbon made from block copolymers via polymerization induced microphase separation

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Mesoporous carbon is widely used in various applications including batteries, fuel cells, electrocatalysts and biosensors. Introducing of polymers as a carbon source can suggest new direction to synthesis of mesoporous carbon with vast chemical composition and functionality. The conversion of polymeric framework to carbon framework without the collapse of the nanostructure is critical to take roots as an alternative way to mesoporous carbon. To the best knowledge, we first report direct access to mesoporous carbon from mesoporous polymer monolith with the marriage of polymerization induced microphase separation (PIMS) and hypercrosslinking. Styrene is grown to PEO-Br macroinitiator and in situ crosslinked by divinylbenzene by atom transfer radical polymerization (ATRP). Polystyrene matrix is hypercrosslinked by external crosslinker. Further heat treatment results in carbon framework with mesopores from PEO block which is thermally decomposed. It is expected that polymeric framework is converted to carbon framework with mesopores maintaining its nanostructure. Also, It is anticipated that pore size can be tuned by adding PEO homopolymer as a pore expander during polymerization.