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Templated electrodeposition of nanoporous silicon for battery applications STEPHANIE LIM, Bryn Mawr College, PA, USA, KARINE NAMUR, FLORIE MARTINEAU, JEREMY MALLET, Universite de Reims, France, JIABIN LIU, QIAN WU, HAN-CHANG YANG, X. M. CHENG, Bryn Mawr College, PA, USA — While battery technology has improved greatly in the last several years, the ability of batteries to store energy is still small compared to that of fossil fuels. In lithium ion batteries, the key issue is insufficient energy density, which is related to the interfacial surface area of the battery electrode. There is an urgent need to develop high capacity electrode materials and among the most promising candidates are Si based anode materials with specific energy capacities up to ten times greater than those of conventional graphite-based materials. We report the fabrication of nanoporous Si using templated electrochemical deposition method. The fabrication involves the following steps: self-assembly of monodispersed polystyrene spheres, electrochemical deposition of Si into the self-assembled template, and sphere removal by a dissolution process. The pore size of the nanoporous Si was tuned by using various sizes of template polystyrene spheres. Scanning electron microscopy images confirmed the high porosity of the samples. The templated electrochemical deposition technique provides a promising alternative approach to preparing highly porous anode materials for battery applications.

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