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(54) Title: STRUCTURED SILICON BATTERY ANODES

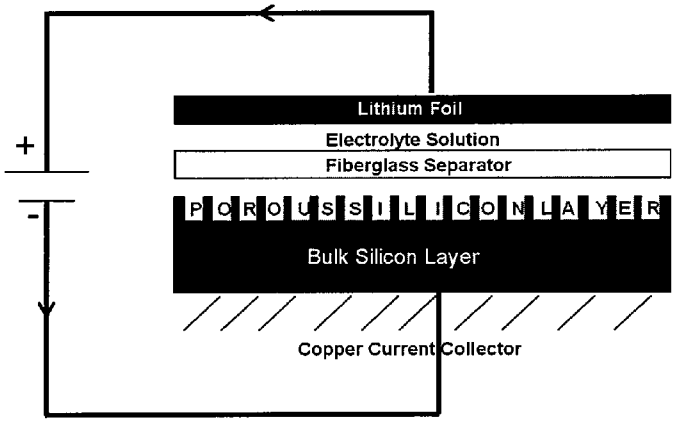

FIG. 1

(57) Abstract: Methods of fabricating porous silicon by electrochemical etching and subsequent coating with a passivating agent process are provided. The coated porous silicon can be used to make anodes and batteries. It is capable of alloying with large amounts of lithium ions, has a capacity of at least 1000 mAh/g and retains this ability through at least 60 charge/discharge cycles. A particular pSi formulation provides very high capacity (3000 mAh/g) for at least 60 cycles, which is 80% of theoretical value of silicon. The Coulombic efficiency after the third cycle is between 95-99%. The very best capacity exceeds 3400 mAh/g and the very best cycle life exceeds 240 cycles, and the capacity and cycle life can be varied as needed for the application.

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