

Supplementary information

Comparison of the performance of our micrometric Si-based electrode with that of state-of-the-art nanostructured Si anodes.

reference	Active material	Specific capacity (mAh/g electrode)	Surface capacity ¹ (mAh/cm ² electrode)
Present work	Micrometric Si powder	1170 (600 cycles)	0.82 (600 cycles)
Liu et al., <i>Adv. Mater.</i> 23 (2011) 4679	Nanometric Si powder	1400 (650 cycles)	0.42 (650 cycles)
Kovenlenko et al, <i>Science</i> 334 (2011) 75	Nanometric Si powder	770 (1300 cycles)	?
Koo et al, <i>Angew. Chem. Int. Ed.</i> 51 (2012) 8762	Nanometric Si powder	1200 (100 cycles)	?
H. Wu et al., <i>Nat. Nano.</i> , 7, (2012) 310.	Si nanotubes	1500 (600 cycles)	0.15 (600 cycles)

¹ The surface capacity is obtained by the multiplication of the specific capacity by the electrode loading.

Production cost estimation

The cost estimation for the industrial production of nanostructured Si powder by milling was determined from contact with suppliers of industrial ball-millers and from our previous experiences on the production at pilot-scale using attritor-type (Union Process) millers of various nanostructured powders (Cu-based and Ti-based alloys) previously synthesized at laboratory scale using a vibratory-type (Spex) miller.

The cost estimation is based on a daily production of 100 kg of Si powder using a SD-100 attritor from Union Process (www.unionprocess.com). In first approximation, the milling duration to produce nanostructured Si powder from metallurgical-grade Si powder using this apparatus was estimated at 24 h.

The cost of the starting metallurgical-grade Si powder was not included in the calculation (cost estimated at 2 \$ / kg).

		Daily cost (for 100 kg per day)
equipment (SD-100 from Union Process)	140 000 \$ (service life estimated at 10 years)	38 \$ ^a
Consumables (balls, argon, process control agent...)	30 000 \$/year	82 \$ ^b

Labor	50 \$/h	100 \$ ^c
Electricity	0.05 \$/kWh	28 \$ ^d
TOTAL		~250 \$ / 100 kg Si = ~2 euros/kg

^a $140\,000 / (10 \times 365)$

^b $30\,000 / 365$

^c based on 2 h of labor per day (1 h for filling the tank and starting the miller and 1 h to empty the milled powder from the tank)

^d $40A \times 575V \times 24h \times 0.05\$/1000$